

Marine Short Sleeve Shirt Year 3 - Technical Report

Date: June 15, 1999

Apparel Technology and Research Center
California State Polytechnic University, Pomona

19990817 074

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DTIC QUALITY INSPECTED 4

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 074-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE June 15, 1999	3. REPORT TYPE AND DATES COVERED Technical Report	
4. TITLE AND SUBTITLE DLA Demonstration Marine Short Sleeve Shirt Year 3 – Final Technical Report			5. FUNDING NUMBERS SPO100-95-D1012	
6. AUTHOR(S) Apparel Technology & Research Center Staff Lynne Uribe, P.E. – Uribe & Associates				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Apparel Technology & Research Center Cal Poly Pomona 3801 W. Temple Ave., #45 Pomona, CA 91768			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Defense Logistics MMPRT Room 3135 8725 John J. Kingman Road, #2533 Fort Belvoir, VA 22060-6221			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION / AVAILABILITY STATEMENT <i>Unlimited.</i>			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 Words) The Cal Poly Demo (Demo) was funded by the Defense Logistics Agency's (DLA) Apparel Research Network (ARN) to establish a research and demonstration manufacturing activity. The work of the Demo is in support of the DLA and Defense Supply Center, Philadelphia's (DSCP) requirement to provide apparel items to the military services. The Demo was specifically directed to determine true costs and document problems related to the manufacturing of military apparel items. The Cal Poly Demo produces military items in small quantities and used the Marine men's short sleeve dress shirt as one of its study subjects. This report includes the findings of the study for the Demo's Year 3 manufacturing of the shirt				
14. SUBJECT TERMS Marine shirt Cost study			15. NUMBER OF PAGES 79	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT unclassified	20. LIMITATION OF ABSTRACT unclassified	

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Foreward

The Apparel Technology and Research Center (Cal Poly Demo) was funded by the Defense Logistics Agency's (DLA) Apparel Research Network (ARN) to establish a demonstration and research manufacturing activity. As part of the ARN program, the work of the Cal Poly Demo is in support of the DLA and the Defense Supply Center, Philadelphia (DSCP) by:

1. Conducting studies on costs and problems associated with the manufacturing of military garments;
2. Manufacturing military garments the DSCP had difficulty placing with commercial businesses;
3. Recruiting new businesses to become military contractors through an incubator production program; and
4. Transferring the lessons learned in the demonstration factory to industry through an industry advisory committee, a newsletter, a Home Page and other events and activities.

During the first three years the following military items were produced and studied by the demonstration factory:

- a. Marine men's short sleeve dress shirt
- b. Marine maternity dress uniform - tunic, skirt, and slack
- c. All service maternity Battle Dress Uniform - coat and slack

The purpose has been to identify and establish measurements and costs at each manufacturing function level as a basis for implementing continuous improvement to lower production costs, decrease lead times and maintain/increase quality levels.

Individual reports will be completed for each of the letters above.

This report is for the Marine men's short sleeve dress shirt the Cal Poly Demo produced on a monthly basis in support of the Marine Corp Recruit Depot - San Diego.

Executive Summary

Marine Short Sleeve Shirt

Background, Objectives and Scope

As stated in the Foreward, the Cal Poly Demo (Demo) was established to be a demonstration and research manufacturing activity to support the Defense Logistics Agency (DLA) and the Defense Supply Center, Philadelphia (DSCP). The DLA's Apparel Research Network (ARN) focus for the Demo was to develop the capability to produce military specification items according to the following three objectives and the ARN Statement of Work:

1. Shared Production of military and commercial garments within the same manufacturing facility;
2. Quick Response to orders for garments that are fulfilled directly from production not from inventory; and
3. Direct Vendor Delivery of the garments to the end customer.

To meet the project's objectives the Demo selected the Marine Short Sleeve Shirt because it is a military specification item, the garment is supplied directly to a recruit induction center, and the short sleeve shirt is mirrored in commercially produced sportswear.

The scope of this report is limited to the documentation of the manufacturing direct and indirect labor costs, holding cost of finished goods inventory and problems encountered for each of the Demo's factory hierarchy levels.

Manufacturing Cost Summary

As established in sections 2.1 through 2.7 of this report, the total labor hours for manufacturing the Marine Short Sleeve Shirt is 0.9061 hours per shirt. The Demo's cost to produce the shirt is \$8.09. This cost excludes all material and trim costs. The cost breakdown per hierarchy level and Demo personnel is illustrated in the following table:

Marine Short Sleeve Shirt - Labor Cost Table					
Step	Cost Element	Total Hours Per Unit	Demo Labor Rate	Costs Per Unit	Total Cost Per Unit
2.1	Plan & Init.ate Production	0.0019 0.0003	\$22.23 \$23.81	\$0.05	\$0.05
2.2	Manage Raw Material Inventory	0.0054 0.0017	\$7.12 \$10.16	\$0.06	\$0.06
2.3	Develop Patterns & Markers	0.0002	\$10.16	\$0.00	\$0.00
2.4	Spread, Cut and Bundle	0.0197	\$10.16	\$0.20	\$0.20
2.5	Sew, Finish and Inspect	0.7864 0.0006	\$9.00 \$23.57	\$7.09	\$7.09
2.6	Manage Finished Goods Inventory	0.0046 ---	\$7.12 \$0.03	\$0.07	\$0.07
2.7	Ship and Invoice	0.0843 0.0004 0.0005 0.0001	\$7.12 \$23.81 \$19.67 \$78.69	\$0.63	\$0.63
	Demo Director	0.0001	\$78.69	\$0.008	
	Production Manager	0.0013	\$23.81	\$0.031	
	Production Assistant	0.0019	\$22.23	\$0.042	
	Machine Technician	0.0005	\$19.67	\$0.010	
	Cutting Operator	0.0216	\$10.16	\$0.219	
	Sew Operator	0.7864	\$9.00	\$7.078	
	Production Manager Assistant	0.0943	\$7.12	\$0.671	
	Container Holding Cost	-----	-----	\$0.032	
	Total	0.9061	----	\$8.091*	\$8.10*
*Totals difference is due to rounding.					

In the next table, the percentage of hours spent by the Demo's personnel to produce the shirt and the respective percentage of the total cost is illustrated.

Summary of Labor & Cost Contribution By the Cal Poly Demo's Personnel Per Marine Short Sleeve Shirt						
Position	Labor Hours Per Unit	% of Total Labor Hours	Demo's Hourly Labor Rate (with benefits)	Total Cost per Unit	% of Total Cost	Labor Survey * Hourly Labor Rate (no benefits)
Cal Poly Demo Director	0.0001	0.01%	\$78.69	\$0.01	0.10%	
Production Manager	0.0013	0.14%	\$23.81	\$0.03	0.38%	\$22.50
Production Assistant	0.0019	0.21%	\$22.23	\$0.04	0.52%	\$17.25
Machine Technician	0.0005	0.06%	\$19.67	\$0.01	0.12%	\$17.50
Cutting Operator	0.0216	2.38%	\$10.16	\$0.22	2.71%	\$ 8.50
Sew Operator	0.7864	86.79%	\$9.00	\$7.08	87.49%	\$ 7.20
Production Manager's Assistant	0.0943	10.41%	\$7.12	\$0.67	8.29%	\$ 7.00
Container Holding Cost	---	---	---	\$0.03	0.40%	
Total	0.9061	100.00%		\$8.09	100.01%	

* The Los Angeles Apparel Industry Wage and Occupational Survey 1998 Report, Linda J. Wong, Director, Los Angeles Manufacturing Networks Initiative with Assistance from Estineh Mailian.

The contribution of each of the factory's hierarchy levels to the total cost are shown in the below table.

Marine Shirt Cost Summary Table Per Factory Hierarchy Level			
Section	Cost Element	Costs	Percent
2.1	Plan & Initiate Production	\$0.05	1%
2.2	Manage Raw Material Inventory	\$0.06	1%
2.3	Develop Patterns & Markers	\$0.00	0%
2.4	Spread, Cut and Bundle	\$0.20	2%
2.5	Sew, Finish and Inspect	\$7.09	88%
2.6	Manage Finished Goods Inventory	\$0.07	1%
2.7	Ship and Invoice	\$0.63	7%
	Total Cost per unit	\$8.10	100%
Note: The \$0.01 difference in price between the two cost tables is due to rounding.			

Also, as noted in section 2.0, in the contract's first year an additional \$0.26 per shirt based on an annual volume of 7,200 units is incurred for the below pre-production expenses:

1. Preparation of Specifications
2. Pattern Making
3. Production of Samples
4. 1st Article Approval
5. Establishment of Vendor Relationships for Trim Material

The cost per unit for the contract's first year is illustrated in the below table:

Total Cost per Unit	\$8.10	96.89 %
Pre-production Expense, 1 st year	\$0.26	3.11 %
Total Cost per Unit, 1 st year	\$8.36	100.00 %

Problems\Solutions Summary

Listed in the following table are the issues the Demo experienced over the first three years for each factory hierarchy level.

Factory Hierarchy Problems/ Solutions Summary Table			
<i>Plan and Initiate Production</i>			
	Problem	Solution	Reference Section
1	Inaccurate forecast and fluctuating order quantities.	Work with Item Manager to improve figures.	Section 2.1
2	Cal Poly Demo receives orders via multiple facsimiles & the order does not reach the production office immediately.	Implement EDI software and training.	Section 2.1
3	Inventory Log located in storage container and performed manually.	Maintain inventory accounting with software.	Section 2.1
<i>Manage Raw Material Inventory</i>			
	Problem	Solution	Reference Section
1	Fabric flaws encountered in both cutting and sewing. In cutting approximately 8% of a roll has fabric flaws. In sewing, an additional 7% of the fabric has "black threads" and requires a re-cut.	Implement procedures when initially receiving the fabric rolls.	Section 2.2
<i>Develop Patterns and Markers</i>			
	Problem	Solution	Reference Section
1	There is a pattern problem with the Marine shirt. The collar dimension does not match the markings on the part to which it is attached.	The Cal Poly Demo has contacted the Marine Corps pattern design department through the DSCP.	Section 2.3
<i>Spread, Cut and Bundle</i>			
	Problem	Solution	Reference Section
1	No problems encountered. The Cal Poly Demo plans to explore software for creating cutting tickets and automatically generating the bundle tickets.	---	Section 2.4

<i>Sew, Finish and Inspect</i>			
	Problem	Solution	Reference Section
1	Low Production Efficiencies	Institute Production Controls	Section 2.5
2	Due to the pattern problem of the collar dimension not matching the markings on the part to which it is attached, excessive time is spent in attaching the collar and wrinkling is occurring.	(As previously stated) The Cal Poly Demo has contacted the Marine Corps pattern design department through the DSCP.	Section 2.5
<i>Manage Finished Goods Inventory</i>			
	Problem	Solution	Reference Section
1	No problems.	---	Section 2.6
<i>Ship and Invoice</i>			
	Problem	Solution	Reference Section
1	The DD250 form software (DD250 Beta Release 1.0 DCMAO Chicago-IRS Team) did not allow building an archive.	The Cal Poly Demo will be receiving a new version of software which allows archiving and doing "Save As".	Section 2.7

Conclusions and/or Recommendations

The Demo in the manufacturing of the Marine Short Sleeve Shirt was able to provide an excellent study garment for evaluation of the needs of the manufacturer. The Demo's successes as related to the project's three previously stated objectives include:

1. **Shared Production** – In Year 3, the Demo successfully produced both military and commercial garments from the same manufacturing work cell, documenting and demonstrating the actual processes and costs that would be experienced by a commercial manufacturer. This will allow a commercial manufacturer the opportunity to actually view the possibility of being a military contractor. By enlarging the number of military contractors who produce both military and commercial garments, the government will create a stronger foundation for keeping uniform inventory levels low without sacrificing the ability to readily supply any needed garment.
2. **Quick Response** – The Demo in Year 3 consistently met the 14 day delivery time for each order with a minimal finished goods inventory cost of \$0.07 per unit, less than 1% of total unit cost. In addition, the Demo in the last period of Year 3 implemented the new EDI software for receiving orders electronically. The software eliminated all order delays experienced by the Demo when receiving orders via the facsimile. However, for the commercial manufacturer orders may still need to be received via the facsimile due to the expense of installing and maintaining an electronic mail system.
3. **Direct Vendor Delivery** – The Demo with no additional effort shipped all units directly to the San Diego Induction Center. The only problem experienced by the Demo was in the completion of the DD250 form required for each shipment. Reference section 2.7 Ship and Invoice for more information.

Based on the Marine Short Sleeve Shirt project's objectives and the results noted, the Demo in Year 4 should continue to document the factory's hierarchy costs to build a database for support of the Virtual Prime Vendor Project work in Year 4. The ARN Statement of Work Demo Cycle requirements will be used to make improvements and identify potential to reduce costs associated with:

1. The direct labor used for sewing, finishing and inspecting using the modular manufacturing system, reference section 2.5. This should include development of set-up times for each operation, operation efficiency and balance of the work cell.
2. The direct labor to spread, cut and bundle the pattern parts, reference section 2.4. This should include development of labor standards for efficiency calculation.
3. The direct labor cost of packing and preparing shipping paperwork, reference section 2.7.

Finally, based on the reported problem of fabric flaws with the government furnished material, reference section 2.2, the Demo in Year 4 should develop a database to analyze fabric roll yield.

Table of Contents

1.0 Introduction	11
1.1 BACKGROUND AND OBJECTIVES	11
1.2 SCOPE.....	12
1.3 METHODOLOGY.....	12
2.0 Marine Short Sleeve Shirt Report DATA.....	13
2.1 PLAN & INITIATE PRODUCTION.....	16
2.2 MANAGE RAW MATERIAL INVENTORY	19
2.3 DEVELOP PATTERNS AND MARKERS	21
2.4 SPREAD, CUT AND BUNDLE	21
2.5 SEW, FINISH AND INSPECT.....	22
2.6 MANAGE FINISHED GOODS INVENTORY.....	26
2.7 SHIP AND INVOICE	27
3.0 CONCLUSIONS AND RECOMMENDATIONS.....	29
Appendix A.....	32
PRE-PRODUCTION COSTS.....	33
SPREAD, CUT AND BUNDLE – ACTUAL LABOR HOURS.....	35
PRODUCTION SUMMARY TABLES	36
MARINE SHORT SLEEVE SHIRT DIRECT & INDIRECT LABOR COST TABLE	37
FACTORY HIERARCHY PROBLEMS/SOLUTIONS SUMMARY TABLE	39
E-MAIL FROM ADELE GASPARRO.....	40
APPENDIX B.....	41
MODAPTS REPORTS.....	42

List of Figures

Figure 1: Cal Poly Demo Factory Hierarchy Levels.....	12
Figure 2: Plan & Initiate Production	16
Figure 3: Manage Raw Materials.....	19
Figure 4: Work Cell Template.....	24

List of Tables

Table 1: Hourly Labor Wage & Experience Level	13
Table 2: Year 3 Orders	13
Table 3: Year 3 Production.....	14
Table 4: Materials Listing.....	14
Table 5: Plan & Initiate Production - Cost Table.....	16
Table 6: Plan & Initiate Production - Problems/Solutions.....	17
Table 7: Manage Raw Materials - Cost Table.....	19
Table 8: Manage Raw Materials - Problems/Solutions	20
Table 9: Develop Patterns and Markers - Cost Table	21
Table 10: Develop Patterns and Markers - Problems/Solutions.....	21
Table 11: Spread, Cut and Bundle - Cost Table	21
Table 12: Spread, Cut and Bundle - Problems/Solutions.....	22
Table 13: Production Summary	23
Table 14: Sew, Finish and Inspect - Cost Table	23
Table 15: Equipment Table	24
Table 16: Sew, Finish and Inspect - Problems/Solutions.....	25
Table 17: Finished Goods Inventory Level.....	26
Table 18: Manage Finished Goods Inventory - Cost Table.....	26
Table 19: Manage Finished Goods Inventory - Problems/Solutions	27
Table 20: Ship and Invoice - Cost Table.....	27
Table 21: Ship and Invoice - Problems/Solutions	28
Table 22: Summary of Labor & Cost Contribution	30

List of Charts

Chart 1: Factory Hierarchy Cost Breakdown.....	29
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1.0 Introduction

This report is for the Marine Short Sleeve Shirt.

1.1 Background and Objectives

As stated in the Foreward, the Cal Poly Demo (Demo) was established to be a demonstration and research manufacturing activity to support the Defense Logistics Agency (DLA) and the Defense Supply Center, Philadelphia (DSCP). The DLA's Apparel Research Network (ARN) focus for the Demo was to develop the capability to produce military specification items according to the following three objectives and the ARN Statement of Work:

4. Shared Production of military and commercial garments within the same manufacturing facility.
5. Quick Response to orders for garments that are fulfilled directly from production not from inventory.
6. Direct Vendor Delivery of the garments to the end customer.

The Marine Short Sleeve Shirt was selected for the project for the following reasons:

1. The garment is a military specification item.
2. The garment is supplied directly to a recruit induction center.
3. The closest recruit induction center to the Demo is in San Diego, California.
4. The San Diego Induction Center only requires male uniforms.
5. The short sleeve shirt is mirrored in commercially produced sportswear.

1.2 Scope

This report's intent is to document the direct and indirect labor costs, holding cost of finished goods inventory and problems experienced by a military/commercial manufacturer with production of the Marine Short Sleeve Shirt. The study's scope is focused on the below factory hierarchy levels:

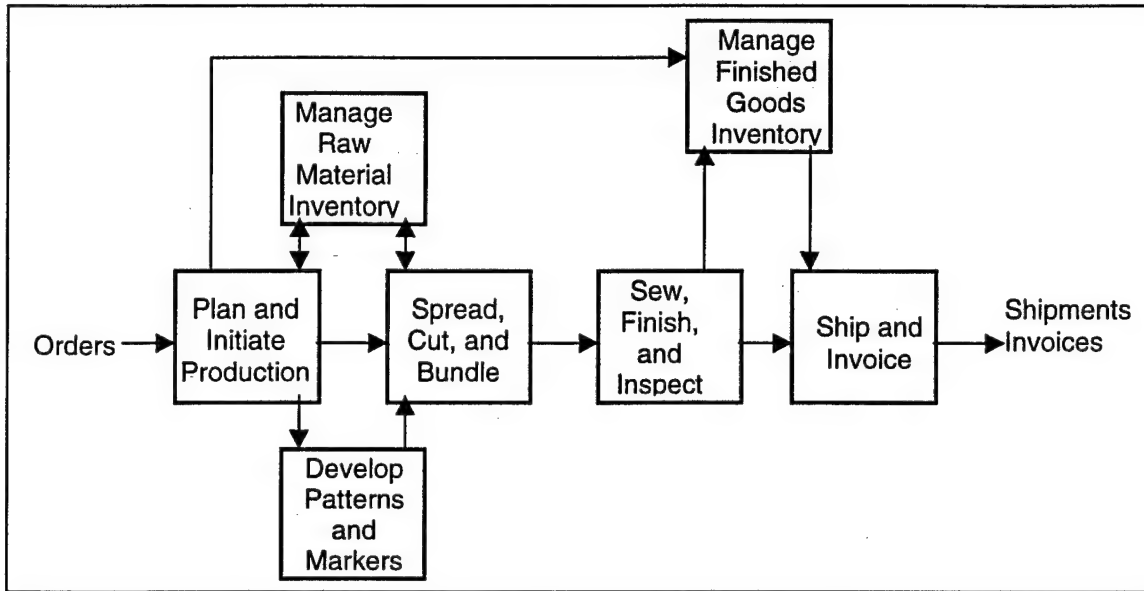


Figure 1: Cal Poly Demo Factory Hierarchy Levels

The information documented is based on the collected findings from the production manager and production assistant during the period of October 1997 - October 1998. The results are presented in the following order for each of the factory's hierarchy levels:

- A. Labor Hours and Cost per military garment
- B. Problems \ Solutions \ Comments

Note: To compile this report interviews were conducted from the Cal Poly Demo's production manager and assistant. No physical data was collected, except where noted in the report. This was due to the manufacturing manager not implementing any control or measurement procedures. In August of 1998 the manufacturing manager was terminated by the Cal Poly Demo. Therefore, the figures included in this report are to be used as a foundation for determining priorities in implementation of controls and measurements in the factory for Year 4.

1.3 Methodology

For each of the hierarchy levels labor cost drivers are defined. The labor hours reported are based on estimations provided by the Demo's personnel, the cutting operator's log book and the actual labor hours reported for each run of the Marine shirt. For productivity measurement of the sew, finish and inspect hierarchy level, standard allowed

minutes are derived using the TimeQuest for Apparel Manufacturing software program, reference Appendix B for more information.

In addition, to calculate labor costs the following pay rates, inclusive of benefits, are used respectively:

Table 1: Hourly Labor Wage & Experience Level			
	Actual		Labor Survey *
Position	\$/Hour with Benefits	Experience Level	\$/Hour no Benefits
Production Manager	\$23.81	10 years	\$22.50
Production Assistant	\$22.23	20 years	\$17.25
Sew Operator	\$9.00	Varies	\$7.20
Cutting Operator	\$10.16	8 years	\$8.50
Production Manager Assistant	\$7.12	1 year	\$7.00
Machine Technician	\$23.57	27 years	\$17.50

* The Los Angeles Apparel Industry Wage and Occupational Survey 1998 Report, Linda J. Wong, Director, Los Angeles Manufacturing Networks Initiative with Assistance from Estineh Mailian.

2.0 Marine Short Sleeve Shirt Report Data

In year 3 the Cal Poly Demo produced only the size 17 short sleeve shirt. Originally, the contract was to produce 600 pieces per month for a total of 7200 pieces annually. As seen in the following two tables both the order quantity per month and the production quantity varied greatly in Year 3.

Table 2: Year 3 Orders		
Date	Delivery Order Number	Quantity
14-Nov-97	243	900
18-Nov-98	244	240
14-May-98	284	960
9-Jul-98	297	1200
19-Aug-98	310	360
	Total	3660
Average Order Quantity (1/5th of quantity annually ordered)		732

Table 3 : Year 3 Production	
Date	Quantity Produced
*Oct-97	898
Nov-97	957
Feb-98	367
Mar-98	173
May-98	132
Jul-98	1459
Aug-98	70
Total w/Oct-97	4056
Total Year 3 Only	3158
Average per month	579
* Produced in Year 2 for Year 3 Orders.	

To calculate management costs for ordering, handling and holding raw materials the Marine Shirt is composed of 6 items, as illustrated in the following table:

Table 4: Materials Listing	
Number	Item
1	Self (Basic Material)
2	Interlining
3	Thread
4	Buttons
5	Identification/Instruction Label
6	Size Label

Also, raw materials and government furnished material (GFM) inventory are replenished in quantities to produce 1200 shirts.

Pre-Production Costs

The Marine Short Sleeve Shirt – size 17 contract was awarded in the Demo's Year 2 and required the extra pre-production expense of steps 1-5 noted next:

1. Preparation of Specifications
2. Pattern Making
3. Production of Samples
4. 1st Article Approval
5. Establishment of Vendor Relationships for Trim Material

These expenses are not included under the factory's hierarchy levels defined in sections 2.1 through 2.7 but, are to be added to the cost of the garments in the contract's first year. For this report no direct documentation of hours were recorded for the start up of the Short Sleeve Shirt contract. Therefore, the costs associated with start up were derived from a previous Demo report, Indirect Labor Activity Cost Study for a Sample Military Apparel Contract, submitted September 21, 1996 and are illustrated in the following table.

Pre-Production Costs Marine Maternity Slack, Skirt and Tunic			
	Activity	Level of Expertise	Cost
1	Preparation of Specifications	Very Experienced	\$116.75
2	Pattern Making	Experienced	\$50.00
3	Production Coordination	Very Experienced	\$410.20
4	Cutting Material	Experienced	\$176.90
5	Production of Samples	Inexperienced	\$1119.06
		Total Cost	\$1,872.91
		Units Produced Annually based on Contract	7,200
		Cost per Unit	\$0.26

For further breakdown of the costs defined in the above Pre-production Costs Table reference Appendix A – Pre-production Costs Breakdown.

2.1 Plan & Initiate Production

For each Marine shirt order the below six steps are followed in the Plan & Initiate Production phase:

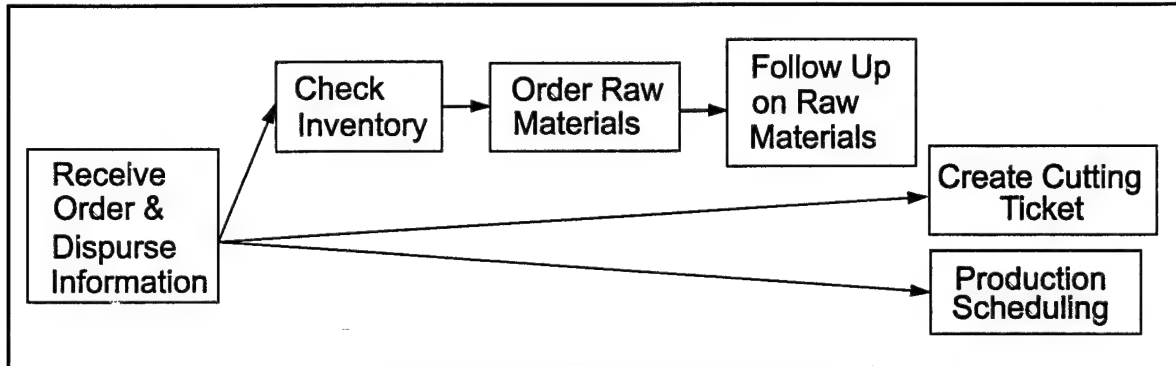


Figure 2: Plan & Initiate Production

The cost elements identified above were all classified as indirect labor costs and were calculated as illustrated in the following table:

Step	Cost Element	Labor Rate (LR)	LR Units	Calculation	Cost
1	Receive Order & Disburse Information	0.08	Hrs/Order	$(0.08 \text{ [hrs/order]} * \$22.23 \text{ [/hr]}) / 732 \text{ [units/order]} =$	\$0.00
2	Check Finished Goods Inventory	0.017	Hrs/Order	$(0.17 \text{ [hrs/order]} * \$22.23 / 732 \text{ [units/order]}) \text{ [hr]} =$	\$0.01
3	Check Raw Materials Inventory	0.08	Hrs/Item Ordered	$(0.08 \text{ [hrs/item]} * 6 \text{ [items]} * \$22.23 \text{ [/hr]}) / 732 \text{ [units/order]} =$	\$0.01
4	Order Raw Materials	0.08	Hrs/Item Ordered	$(0.08 \text{ [hrs/item]} * 6 \text{ [items]} * \$22.23 \text{ [/hr]}) / 1200 \text{ [units/materials order quantity]} =$	\$0.01
5	Create Cutting Ticket	0.33	Hrs/Order	$(0.33 \text{ [hrs/order]} * \$22.23 \text{ [/hr]}) / 732 \text{ [units/order]} =$	\$0.01
6	Schedule Production	0.25	Hrs/Order	$(0.25 \text{ [hr/order]} * \$23.81 \text{ [/hr]}) / 732 \text{ [units/order]} =$	\$0.01
				Total Unit Cost	\$0.05

Note: The Labor Rates used above are estimations provided by the Demo's production manager and assistant.

The breakdown of each of the above steps is documented next.

1. Receive Order & Disburse Information - The production assistant receives the order via facsimile, makes two copies and distributes the copies to the production manager and the student assistant.

2. Check Finished Goods Inventory - The student assistant checks the finished goods inventory level for fulfillment of the order and reports the results to the production manager. If the order can be fulfilled, the student assistant prepares the order for shipment.
3. Check Raw Materials Inventory - The production manager reports to the cutting operator required pieces. The cutting operator checks the raw material inventory for the needed quantities. The cutting operator reports results back to the production manager.
4. Create Cutting Ticket - The production manager reports the number of pieces to be cut and the total yards required to the production assistant. The production assistant completes a cutting ticket and gives the ticket back to the production manager.
5. Order Raw Materials - Based on the inventory information from the production manager and the cutting operator, the production assistant places an order(s) for the needed materials.
6. Schedule Production - The production manager calculates the sewing hours required and consults the master production schedule.

Table 6: Plan & Initiate Production - Problems \ Solutions

	Problem	Solution
1	Inaccurate forecast and fluctuating order quantities.	Work with Item Manager to improve figures.
2	Cal Poly Demo receives orders via multiple facsimiles & the order does not reach the production office immediately.	Implement EDI software/Apparel Order Processing Module and training with EDI Integration Corp.
3	Inventory Log located in storage container and performed manually.	Maintain inventory accounting with software.

Next, each problem is described in more detail:

1. Inaccurate forecast and fluctuating order quantities - For compilation of this technical report there was a lack of documentation due to the departure of the manufacturing manager in August 1998. However, from an electronic message sent from the departed manufacturing manager to Adele Gasparro dated January 16, 1998, it appears the orders for the Marine shirt, size 17, were stopped in December 1998 and rescheduled to resume shipment of 600 units/month February 16, 1998. As seen in Table 2: Year 3 Orders, a total of five orders were shipped in Year 3 with only three orders shipped after the January 16th electronic message. The total quantity shipped in Year 3 was 3660 units. In summary, the Cal Poly Demo did not manufacture and ship a steady supply of the Marine short sleeve shirt in Year 3, as reflected in the previous Tables 2 and 3.

As a result of the order and production fluctuation quantities, the Demo experienced difficulty in the scheduling of production due to the inability to accurately allocate available monthly sew hours. To resolve the inaccurate forecast issue, the Demo in

Year 4 will work with the item manager to clearly establish monthly order and production quantities.

2. Cal Poly Demo receives orders via facsimile - In Year 3 orders for the Marine shirt were received via facsimile. The Cal Poly Demo experienced problems because the orders were not always received from a central facsimile machine and at times were not immediately delivered to the production office. This was an issue because of the 14-day lead-time for the shipment of the order.

This issue was resolved at the end of Year 3, November 1998, with the implementation of the EDI order software. The software had not previously been installed because the software vendor had to remove programming "bugs" before the DSCP approved a working version. Once the Demo received the working version, the Demo's computer consultant installed the program on the sourcing manager's computer. Training on the software was provided over the phone between an EDI technical trainer and the Demo's sourcing manager. The instruction lasted approximately one hour. The following week the Demo began receiving military orders via EDI and all orders are received immediately by the Demo's production office.

3. Inventory log located in storage container and performed manually - In Year 3 the Cal Poly Demo maintained an inventory log only for the GFM, government furnished material. This inventory log was kept in the outside fabric storage containers. No inventory log was maintained for the trim items. With this inventory system the Demo could not track the actual cost of inventory or determine an optimal inventory level for either the fabric or the trim. These two measurements are critical for evaluation of the effectiveness of modular manufacturing.

For Year 4, the Demo plans to track both fabric roll and trim inventory with use of the computer. The Demo wishes to explore using a spreadsheet format or a commercial inventory software program. Potential costs associated with maintaining an inventory log using the computer are as follows: 1. Spreadsheet set-up or purchase of commercial software, 2. Training of inventory clerks, 3. Initial data entry, and 4. Maintenance of the inventory data.

2.2 Manage Raw Material Inventory

For the Marine shirt the following steps are taken in the Manage Raw Material Inventory phase:

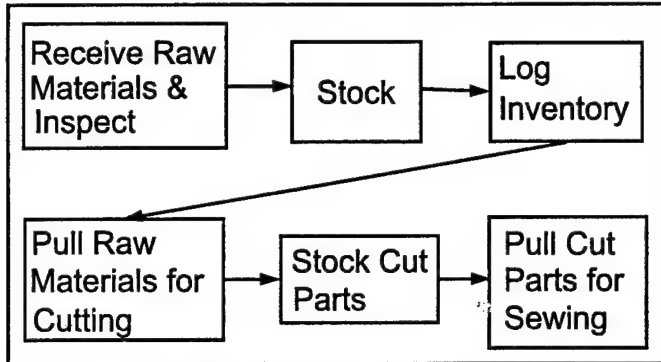


Figure 3: Manage Raw Materials

To initially receive the raw materials the labor was categorized as an indirect labor cost, steps 1 - 3 above. For Pull Materials or Cut Parts the labor was categorized as direct labor costs. In the following table the cost elements are derived for Manage Raw Materials.

Table 7: Manage Raw Materials - Cost Table					
Step	Cost Element	Labor Rate (LR)	LR Units	Calculation	Cost
1	Receive Raw Materials & Inspect (includes GFM): - Order for 1200 shirts - 1.4 yards/shirt - 100 yards/roll, 71 shirts/roll - Receive 17 rolls/shipment	0.08, 0.17	Hrs/Item, Hrs/Roll	$[(.08 \text{ hrs/item} * 6 \text{ items}) + (.17 \text{ hrs/roll} * 17 \text{ rolls})] * \$7.12 / \text{hr} / 1200 \text{ units/shipment} =$	\$0.02
2	Stock	0.08, 0.08	Hrs/Item, Hrs/Roll	$[(.08 \text{ hrs/item} * 6 \text{ items}) + (.08 \text{ hrs/roll} * 9 \text{ rolls})] * \$7.12 / \text{hr} / 1200 \text{ units/shipment} =$	\$0.007
3	Inventory Log - GFM	0.08	Hrs/Roll	$(.08 \text{ hrs/roll} * 17 \text{ rolls}) * \$7.12 / \text{hr} / 1200 \text{ units/shipment} =$	\$0.008
4	Pull Raw Materials for Cutting - 1200 shirt batch size	0.06	Hrs/Roll	$(.06 \text{ hrs/roll} * 17 \text{ rolls}) * \$10.16 / \text{hr} / 1200 \text{ shirt batch size}$	\$0.009
5	Stock Cut Parts	1.00	Hrs/Cut	$1 \text{ hr} * \$10.16 / \text{hr} / 1200 \text{ shirts}$	\$0.008
6	Pull Cut Parts & Trim for Sewing - 579 batch size based on actual Year 3 production	0.28	Hrs/Ave. Batch Size	$.28 \text{ hrs} * \$7.12 / \text{hr} / 579 \text{ average batch size}$	\$0.004
				Total Unit Cost	\$0.06
Note: The Labor Rates used above are estimations provided by the Demo's production manager and assistant.					

The breakdown of each of the above elements is documented next.

1. Receive Raw Materials & Inspect - A production manager 's assistant receives the raw materials (including GFM) from the shipper, verifying that the item and the quantity received matches the packing list. No other inspection is performed.
2. Stock - All raw materials and GFM are moved into storage containers.
3. Inventory Log - Only GFM is logged into inventory. The roll number and quantity received is entered into the log book.
4. Pull Raw Materials for Cutting - The cutting operator obtains the required GFM rolls from inventory and transports the rolls to the spreading table.
5. Stock Cut Parts - After cut and bundle, the cutting operator stocks the bagged cut parts.
6. Pull Cut Parts & Trim for Sewing - One of the production manager's assistants obtains the cut parts and trim supplies from inventory and transports all to the sewing area.

Table 8: Manage Raw Materials - Problems \ Solutions

	Problem	Solution
1	Fabric flaws encountered in both cutting and sewing. In cutting approximately 8% of a roll has fabric flaws. In sewing, an additional 7% of the fabric has "black threads" and requires a re-cut.	Implement procedures when initially receiving the fabric rolls.

As stated in the above table, based on the observation of the production manager the Demo in Year 3 experienced fabric flaws up to 15% for the Marine shirt. The current government policy does not allow a manufacturer to return less than a roll of flawed fabric. The lead-time to order additional GFM (Government Furnished Material) is greater than 14 days. The Demo in Year 3 performed no inspection prior to the fabric being spread to cut. Therefore, the Demo absorbed the extra cost of spreading and cutting around the defective fabric and the sew labor to meet the 14-day order delivery date on some orders. A further cost potentially will be incurred if the Demo used more than the allotted yards per unit.

In Year 4, the Demo plans to research the implementation of checking procedures at the point the fabric rolls are first received. This will provide the Demo enough lead-time to send back flawed fabric and order replacement fabric. Also, by using statistical quality control procedures, data will be available for the government to place the cost of flawed fabric back to the textile manufacturer not to the cut, make and trim manufacturer.

2.3 Develop Patterns and Markers

For the Marine short sleeve shirt, the Cal Poly Demo only produced size 17 in Year 3. Therefore, no pattern work was required. The only cost incurred by the Demo was for printing markers, which was done by the cutting operator.

Table 9: Develop Patterns and Markers - Cost Table					
Step	Cost Element	Labor Rate (LR)	LR Units	Calculation	Cost
1	Print Markers	0.20	Hrs/Cut	.20 hrs/cut * \$10.16/hr / 1200 units	\$0.002
				Total Cost	\$0.00
Note: The Labor Rates used above are estimations provided by the Demo's production manager and assistant.					

Table 10: Develop Patterns and Markers - Problems \ Solutions		
	Problem	Solution
1	There is a pattern problem with the Marine shirt. The collar dimension does not match the markings on the part to which it is attached.	The Cal Poly Demo has contacted the Marine Corps pattern design department through the DSCP.

To correct the collar dimension problem identified in the above table, the Cal Poly Demo met with the head Marine Corps designer in January 1999 of Year 4. The issue is currently under review.

2.4 Spread, Cut and Bundle

The Cal Poly Demo cuts using a batch size of 1200 units. All costs associated with spread, cut and bundle are categorized as direct labor costs. The following table defines each cost element.

Table 11: Spread, Cut and Bundle - Cost Table					
Step	Cost Element	Labor Rate (LR)	LR Units	Calculation	Cost
1	Spread	8.0	Hrs/1200 Units	8 hrs * \$10.16/hr/1200 units	\$0.07
2	Cut	4.17	Hrs/1200 Units	4.17 hrs * \$10.16/1200 units	\$0.04
3	Bundle	11.43	Hrs/1200 Units	11.43 hrs * \$10.16 / 1200 units	\$0.10
				Total Unit Cost	\$0.20
Note: The Labor Rates used above are based on the cutting operator's log. Reference Appendix A for table of logged hours.					

The above steps are defined below:

1. Spread - The marker length is 6 yards and 34 inches with 5 sets of parts. The cutter spreads an average of 15 plys per roll.
2. Cut - The Cal Poly Demo uses the Lectra automated cutter.
3. Bundle - The cutting operator prints bundle tickets and places them with each bundle. The bundles are placed in boxes for storage.

Table 12: Spread, Cut and Bundle - Problems \ Solutions	
	Problem \ Solution\ Comments
1	No problems encountered. The Cal Poly Demo plans to explore software for creating cutting tickets and automatically generating the bundle tickets.

As stated in the above table, the Cal Poly Demo plans to explore software that automatically generates bundle tickets once the cutting ticket information is entered. In Year 3, the cutting operator read the cutting ticket information, opened an existing bundle ticket file in the computer, made changes specific to the cutting ticket and then, printed the bundle tickets. From an interview of the cutting operator, approximately 0.43 hours was spent in the preparation of the bundle tickets. This time could be reduced or eliminated with software that automatically produces the bundle tickets from the cutting ticket information.

2.5 Sew, Finish and Inspect

The Cal Poly Demo produced the Marine shirt using the kan ban modular manufacturing method. Using kan ban, the operations to produce the Marine shirt are spread among a team of sew operators with an average bundle size of 15 pieces. All operators are standing and move from machine to machine to complete the assigned operations. When an operator does not have any parts waiting in her queue, the operator will assist the supplying/feeding operator prior to her operations. With this method an operator is never idle.

To complete both the sewing and finishing operations the standard allowed minutes (SAMS) is calculated to be 22.5167 minutes per shirt. (Reference Appendix B – MODAPTS Reports for breakdown of SAMS.) This time accounts for all handling and process time pertaining to the sewing and finishing operations. The hourly capacity based on the SAMS is 2.66 units per hour per operator.

In Year 3, the Cal Poly Demo made one major change in the production of the Marine shirt. The Production Manager to try and improve daily team output split the sewing and finishing operations into two teams. The change occurred in July 1998. The following table documents the impact on production:

Table 13 – Production Summary Actual versus Standard				
	Actual Hours per Units Produced			Standard
	Period #1 Nov 97 - May 98 Single Team	Period #2 Jul 98 - Sep 98 Two Teams	Total Year 3	SAMS
Weighted Average, Minutes per Unit	33.9411	57.0028	47.0670	22.5167
Units per Hour, 1 Operator	1.77	1.05	1.27	2.66
% Efficiency	66.34%	39.50%	47.84%	
<ul style="list-style-type: none"> Reference Appendix A – Production Summary Tables for Year 3 actuals. Reference Appendix B – MODAPTS Reports for derivation of the SAMS used above. 				

From the Production Summary Table it can be seen that the Demo experienced a negative impact on performance with the change to two teams; output declining from 1.77 units/hr/operator in Period 1 to 1.05 units/hr/operator in Period 2, a 59.3% decrease in productivity. Overall, the percent efficiencies reported in the previous table indicates further work needs to be completed to raise productivity. (See Table 16: Sew, Finish, and Inspect – Problems/Solutions located in this section for further discussion.)

To calculate the total cost for the Sew, Finish and Inspect hierarchy level, the time to set up the work cell and the bundles of cut parts must also be included, as shown in the following table. All costs are categorized as direct labor costs.

Table 14: Sew, Finish and Inspect - Cost Table					
Step	Cost Element	Labor Rate (LR)	LR Units	Calculation	Cost
1	Work Cell Setup - Operator Labor, \$9/hr - Technician Labor, \$23.57/hr	0.33	Hrs/Setup	(.33 hrs * 6 operators * \$9/hr) + (.33 hrs * 1 technician * \$23.57/hr) / 579 units	\$0.03
2	Sew & Finish * Based on Year 3 Actual Average Minutes per unit	47.07	Minutes/Unit	47.07 mins * 1 hr/60 mins * \$9/hr	\$7.06
				Total Cost	\$7.09
Note: The Labor Rate used for the Work Cell Setup Cost Element is an estimation provided by the Demo's production manager. The Labor Rate for the Sew & Finish Cost Element is based on actual reported hours and units produced in Year 3. Reference Appendix A for the Year 3 Production Summary Tables.					

Each cost driver in the above table is defined next.

1. Work Cell Setup - The technician arranges the machines based on the following equipment table and the work cell template. The sewing operators assist with machine adjustment and open the bundled parts.

Table 15: Equipment Table		
Location #	Machine Description	MFE Name
1	Micro-promstitcher	Ideal - #6833
2	Turning	Lunapress -#CP-323S
3	Single needle	Singer - #591-D300G
4	Double Needle	Juki - #LH-3178
5	Pocket (automated)	Durkopp - # 805
6	3/t Overlock	Yamato - #25016
7	Single Needle	Juki - #DDL-555-4
8	Single Needle	Juki - #DDL-5550N - 3
9	5/t Overlock	Brother - #MA4-V61-95-5
10	Single Needle	Juki - #DDL-5550N-7
11	Single Needle	Juki - #DDL-5410N-7
12	Button Hole	Juki - #LBH-783
13	Button	Juki - #BR10
14	Bar Tack	Juki - #LK3-B430E-2

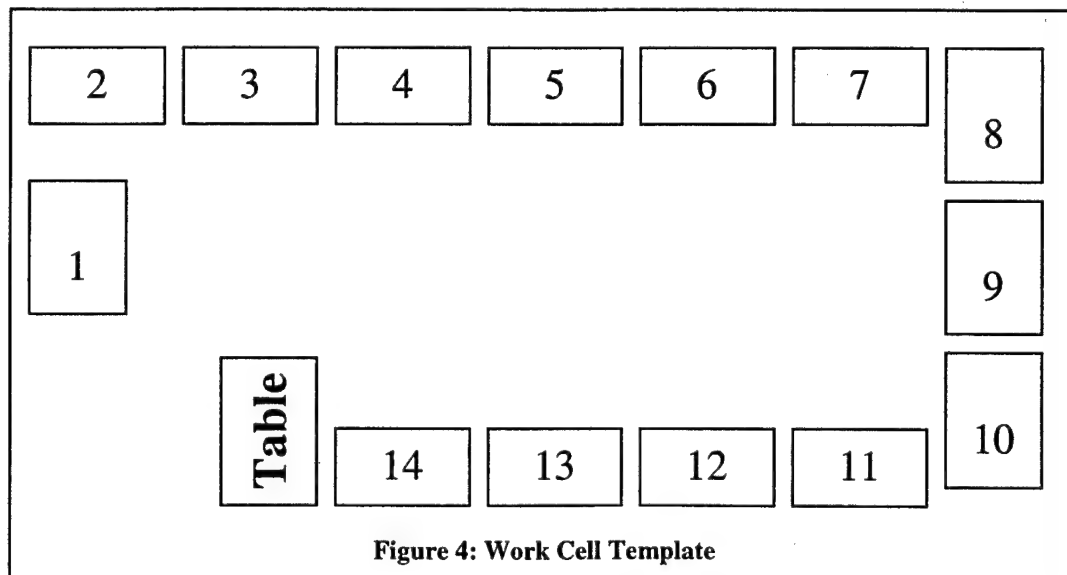


Figure 4: Work Cell Template

2. Sew & Finish - The labor rate for the Sew & Finish Cost Element is based on actual reported hours and units produced in Year 3. Reference Appendix A for the Year 3 Production Summary Tables. Also, see Appendix B – MODAPTS Reports for a list of operations and standard allowed minutes (SAMS).

Table 16: Sew, Finish and Inspect - Problems \ Solutions

	Problem	Solution
1	Low Production Efficiencies	Institute Production Controls
2	Due to the pattern problem of the collar dimension not matching the markings on the part to which it is attached, excessive time is spent in attaching the collar and wrinkling is occurring.	(As previously stated) The Cal Poly Demo has contacted the Marine Corps pattern design department through the DSCP.

Next, each problem defined previously is discussed in detail:

1. Low Production Efficiencies – As reported in the production summary table, in the first period of Year 3 the Demo was 66.34% of standard. To try and raise productivity, the sewing and finishing operations were separated into two teams in Year 3's period two. This resulted in a negative impact on productivity, a 59% decrease in hourly output. See Table 13 – Production Summary of Actual versus Standard presented earlier in this section.

Much of the decline in productivity is attributed to low worker morale and motivation to perform. As stated previously, the Manufacturing Manager had not implemented a management feedback loop. Consequently, the Demo's operators were not informed of any production goals and did not have any system for reporting production problems. This directly contributed to a lack of team unity that is essential to modular manufacturing.

To improve productivity, the Demo must implement a formal management feedback system. The feedback system must provide operators with daily production goals, a format for recording actual production figures and a formal system for recording problems. Combined with this information the operators must meet regularly to evaluate, recommend and implement solutions based on the reported actuals and problems. Once a feedback system is implemented the Demo can begin an engineered process of evaluating new technologies and sewing methods.

2. Pattern Problem - Reference section 2.3 Develop Patterns and Markers for further information regarding the problem stated above.

2.6 Manage Finished Goods Inventory

Due to the variation in the monthly order quantities the Cal Poly Demo maintained an inventory of finished Marine shirts to insure compliance to delivery dates, as illustrated in the following table.

Table 17: Finished Goods Inventory Level		
Month	Inventory Level	Re-stock/ Deplete (-)
Jan-98	346	0
Feb-98	713	367
Mar-98	886	173
Apr-98	886	0
May-98	10	-876
Jun-98	10	0
Jul-98	265	255
Aug-98	129	-136
Average Level	405.625	
Average Stock Quantity		265

The cost elements for stocking and holding finished goods inventory is reported in the below table.

Table 18: Manage Finished Goods Inventory - Cost Table					
Step	Cost Element	Labor Rate (LR)	LR Units	Calculation	Cost
1	Stock Finished Goods - 1.23 hours per 265 units (ave. stock quantity, see previous table)	1.23	Hrs/Ave. # of Units Stocked	(1.23 hrs * \$7.12)/265 Units Ordered in Year 3	\$0.033
2	Holding Cost - Container \$780/year - 15% (.15) space allocated to shirt inventory	----	----	(\$780 * .15 space/container)/3660 Units	\$0.032
Total Cost					\$0.07
Note: The Labor Rate used for the Stock Finished Goods cost element is based on an estimation provided by the Demo's production manager.					

The following is a description of the above cost elements.

1. Stock Finished Goods - The production manager's assistant transports finished shirts from the finishing area to storage containers and logs the inventory level.
2. Holding Cost - The Cal Poly Demo uses portable storage containers located outside of the factory. The rental fee is \$65 per month or \$780 per year. On average, 15% of a container is dedicated to the Marine shirt.

Table 19: Manage Finished Goods Inventory – Problems/Solutions		
	Problem \ Solution\ Comments	
1	No problems.	

2.7 Ship and Invoice

The following table contains the cost elements for the Ship and Invoice hierarchy level.

Table 20: Ship and Invoice - Cost Table					
Step	Cost Element	Labor Rate (LR)	LR Units	Calculation	Cost
1	Pack & Complete Shipper Paperwork	0.08	Hrs/unit	(.08 hrs/unit * \$7.12/hr)	\$0.60
2	Complete DD250	0.32	Hrs/order	(.32 hrs/order * \$23.81/hr) / 732 ave. order qty.	\$0.01
3	Process DD250, 1 st Level	0.33	Hrs/order	(.33 hrs * \$19.67/hr)/732	\$0.01
4	Process DD250, 2 nd Level	0.08	Hrs/order	(.08 hrs * 78.69/hr)/ 732	\$0.01
Total Cost					\$0.63
Note: The Labor Rates used above are estimations provided by the Demo's Production manager and assistant.					

The cost elements are defined next.

1. Pack & Complete Shipper Paperwork - The production manager's assistant packs 90 units/box, secures the box with tape and completes shipping paperwork.
2. Complete DD250 - The production assistant completes all fields on the DD250 form.
3. Process DD250, 1st Level - The Cal Poly Demo military accounts administrator reviews the DD250, signs off on the production batch sheet, logs the order into a spreadsheet, posts the order to the Demo's internal financial ledger, copies the DD250 for filing and sends the original DD250 to Foundation for billing.
4. Process DD250, 2nd Level - The Cal Poly Demo Director reviews and signs off the DD250.

Table 21: Ship and Invoice - Problems \ Solutions		
	Problem	Solution
1	The DD250 form software(DD250 Beta Release 1.0 DCMAO Chicago - IRS Team) did not allow building an archive.	The Cal Poly Demo will be receiving new software that will allow doing "Save As".

To ship a military order the Cal Poly Demo must fill in the government's Material Inspection and Receiving Report, DD250 form. This form requires 20 field entries such as Contract number, Shipment number, Prime contractor, Administered by, Item number, Quantity, etc. For the Marine shirt eleven of the fields are identical on every report.

In Year 3, the DD250 software program (DD250 Beta Release 1.0 DCMAO Chicago - IRS Team) available to the Cal Poly Demo did not allow building an archive using a "Save As" command common to almost all computer software programs. Therefore, for every military order the Demo's clerk had to retype all 20 field entries.

As mentioned in the previous table, the Demo will be receiving new DD250 software that is able to build an archive of DD250 reports eliminating the stated problem.

3.0 Conclusions and Recommendations

The goal of the Cal Poly Demo's Marine Short Sleeve Shirt Project is to supply the government with the necessary information to ultimately lower the costs of military garments without jeopardizing the availability of a garment. This project's objectives are:

1. Shared Production of military and commercial production.
2. Quick Response to keep inventories, inventory cost, of military garments low.
3. Direct Vendor Delivery to eliminate unnecessary holding and shipping costs.

In Year 3, the Demo experienced the below results in relation to the three above objectives:

1. Shared Production – In Year 3, the Demo produced both military and commercial garments from the same manufacturing work cell, documenting and demonstrating the actual processes and costs that would be experienced by a commercial manufacturer. This is important for the recruitment of additional military manufacturers.

In summary for sections 2.1 through 2.7, the Demo in the Year 3 time period from November 1997 – October 1998 identified the direct and indirect labor cost drivers, the holding cost of finished goods inventory, and problems associated with each hierarchy level involved with the manufacturing of the Marine Short Sleeve Shirt.

The total manufacturing unit cost, excluding material costs, associated with the production of the Marine Short Sleeve Shirt is calculated to be \$8.10, reference Appendix A – Marine Short Sleeve Shirt Cost Table. The contributions of each of the factory hierarchy levels to the total cost are illustrated in the following figure.

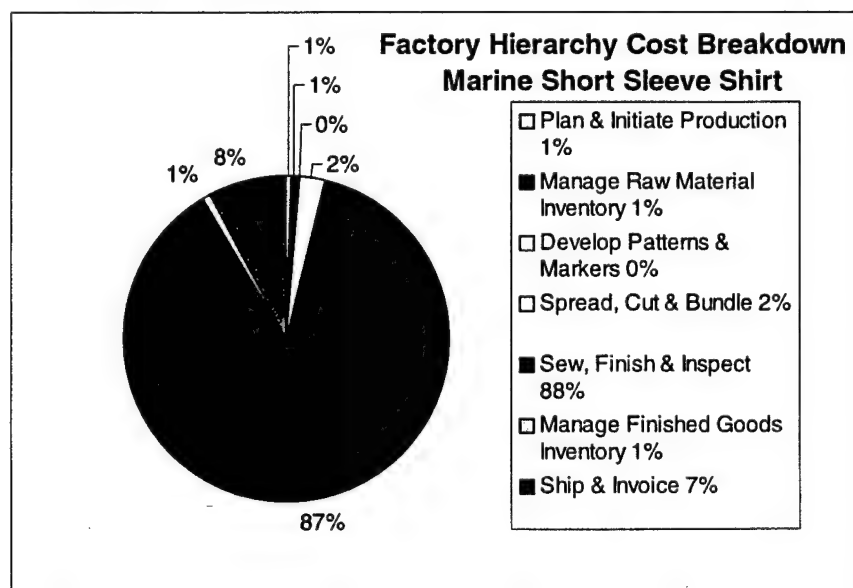


Chart 1: Factory Hierarchy Cost Breakdown

As identified in the previous chart, the majority of cost, 88%, is associated with the direct labor for sewing, finishing and inspecting. The next highest contributors are respectively the shipping and invoicing hierarchy level, 7%, and the spread, cut and bundle hierarchy level, 2%.

Accordingly, the Demo's personnel associated with the three hierarchy levels contribute the greatest labor hours in the manufacturing of the shirt. The hours derived for each position and the hourly labor rate are summarized in the following table.

**Table 22: Summary of Labor & Cost Contribution
By the Cal Poly Demo's Personnel
Per Marine Short Sleeve Shirt**

Position	Labor Hours Per Unit	% of Total Labor Hours	Demo's Hourly Labor Rate (with benefits)	Total Cost per Unit	% of Total Cost	Labor Survey * Hourly Labor Rate (no benefits)
Cal Poly Demo Director	0.0001	0.01%	\$78.69	\$0.01	0.10%	
Production Manager	0.0013	0.14%	\$23.81	\$0.03	0.38%	\$22.50
Production Assistant	0.0019	0.21%	\$22.23	\$0.04	0.52%	\$17.25
Machine Technician	0.0005	0.06%	\$19.67	\$0.01	0.12%	\$17.50
Cutting Operator	0.0216	2.38%	\$10.16	\$0.22	2.71%	\$ 8.50
Sew Operator	0.7864	86.79%	\$9.00	\$7.08	87.49%	\$ 7.20
Production Manager's Assistant	0.0943	10.41%	\$7.12	\$0.67	8.29%	\$ 7.00
Container Holding Cost	---	---	---	\$0.03	0.40%	
Total	0.9061	100.00%		\$8.09	100.01%	

* The Los Angeles Apparel Industry Wage and Occupational Survey 1998 Report, Linda J. Wong, Director, Los Angeles Manufacturing Networks Initiative with Assistance from Estineh Mailian.

The cutting operator and sew operators perform work only in their titles' specified area. The production manager's assistant performs work across three hierarchy levels: Manage Raw Material Inventory, Manage Finished Goods Inventory and Ship and Invoice. To view the complete breakdown of labor involved with each hierarchy level, reference Appendix A – Summary of Labor & Cost Contribution by the Cal Poly Demo's personnel table.

A summary table of the problems identified for each hierarchy level is located in Appendix A – Factory Hierarchy Problems/Solutions Table.

3. Quick Response – To meet the 14-day delivery time from receipt of order, the Demo did inventory finished goods. A finished goods inventory was required for the Demo as a result of the fluctuating and sporadic order quantities. In Year 3, a total of five orders were received with order quantities ranging from 240 to 1200 units, reference section 2.0 for further information. As documented in section 2.7 Finished Goods Inventory, the average finished goods inventory level was 405 units per month at a cost of \$28.35 per month, \$.07 per unit, for both the labor and holding container costs. Overall, the Demo was successful at meeting the short delivery time at a minimal inventory cost, less than 1% of the total unit price,

The second element to the Quick Response objective was in the implementation of the EDI software/Apparel Order Processing Module (AOPM) at the end of Year 3. The EDI software enabled the Demo to receive orders electronically, eliminating the delay problem experienced by the Demo when receiving orders via a facsimile, reference section 2.1 Plan and Initiate Production. Any delay in receiving an order was critical because of the short 14-day delivery time. However, for the commercial manufacturer orders may still need to be received via the facsimile due to the expense of installing and maintaining an electronic mail system.

3. Direct Vendor Delivery – The Demo shipped all units directly to the San Diego Induction Center. The only problem experienced by the Demo was in the completion of the DD250 form required for each shipment.

Based on the Marine Short Sleeve Shirt Project's objectives and the results noted, the Demo in Year 4 should continue to document the factory's hierarchy costs to build a database for support of the Virtual Prime Vendor Project. In addition, special emphasis should be placed on reduction of costs associated with:

1. The direct labor used for sewing, finishing and inspecting using the modular manufacturing system, reference section 2.5. This should include development of set-up times for each operation, operation efficiency and balance of the work cell.
2. The direct labor to spread, cut and bundle the pattern parts, reference section 2.4. This should include development of labor standards for efficiency calculation.
3. The direct labor cost of packing and preparing shipping paperwork, reference section 2.7.

Also, based on the reported problem of fabric flaws with the government furnished material, reference section 2.2, the Demo in Year 4 should develop a database to analyze fabric roll yield.

Appendix A

Pre-Production Costs Breakdown

The Pre-production costs defined in the following tables are based on the Indirect Labor Activity Cost Study for a Sample Military Apparel Contract Report submitted September 21, 1996 by the Demo. As shown some of the pay rates were changed to reflect the activity performed directly by the ATRC staff.

Pre-Production Costs Maternity Slack, Skirt and Tunic			
	Activity	Level of Expertise	Cost
1	Preparation of Specifications	Very Experienced	\$116.75
2	Pattern Making	Experienced	\$50.00
3	Production Coordination	Very Experienced	\$410.20
4	Cutting Material	Experienced	\$176.90
5	Production of Samples	Inexperienced	\$1119.06
		Total Cost	\$1,872.91
		Units Produced Annually based on Contract	7,200
		Cost per Unit	\$0.26

Pre-production Cost – Preparation of Specifications			
Step	Cost Element	Calculation	Cost
1	Preparation of Specifications - 14 hours/ 3 garments = 4.67 hrs/garment	$(4.67 \text{ hrs/garment} * 1 \text{ garments} * \$25/\text{hr}) =$	\$ 116.75
		Total Cost	\$116.75
		Units Produced Annually based on Contract	7,200
		Unit Cost	\$ 0.02

Pre-production Cost – Pattern Making			
Step	Cost Element	Calculation	Cost
1	Shirt Pattern	\$50	\$ 50.00
		Total Cost	\$50.00
		Units Produced Annually based on Contract	7,200
		Unit Cost	\$ 0.01

Pre-production Cost – Production Coordination			
Step	Cost Element	Calculation	Cost
1	Review Pattern, fabric, trims, etc. necessary to produce samples and coordinate pattern work. - 4 hours/3 garments = 1.25 hrs	$1.25 \text{ hrs} * \$60 / \text{hr}$	\$75.00
2	Review construction methods with team leader to assemble samples - 2 hours / 3 garments = 0.67 hrs	$0.67 \text{ hrs} * \$60 / \text{hr}$	\$40.20

3	Review samples - 2.5 hours/ 3 garments = 0.83 hours	0.83 hrs * \$60 /hr	\$50.00
4	Send samples - 0.5 hours/3 garments = 0.17 hours	0.17 hrs * \$60 /hr	\$5.00
5	Contract related activities - 12 hours/3 garments = 4.0 hours	4 hrs * \$60 /hr	\$240.00
		Total Cost	\$410.20
		Units Produced Annually based on Contract	7,200
		Unit Cost	\$0.06

Pre-production Cost – Cutting Material			
Step	Cost Element	Calculation	Cost
1	Pre-Production	1.5 hrs * \$10.16 /hr	\$15.24
2	Spreading	0.75 hrs * \$10.16 /hr	\$7.62
3	Cutting	1.0 hrs * \$10.16 /hr	\$10.16
4	Bundling	0.5 hrs * \$10.16 /hr	\$5.08
5	Marker	1.5 hrs * \$10.16 /hr	\$15.24
6	Office	0.5 hrs * \$7.12 /hr	\$3.56
7	Management Labor	3.0 hrs * \$40 /hr	\$120.00
		Total Cost	\$176.90
		Units Produced Annually based on Contract	7,200
		Unit Cost	\$0.02

Pre-production Cost – Production of Samples			
Step	Cost Element	Calculation	Cost
1	Planning Meeting	6.0 hrs * \$40 /hr	\$240.00
2	Source Fabric & Patterns	2.0 hrs * \$40 /hr	\$80.00
3	Implementation Meeting	1.45 hrs * \$40 /hr	\$58.00
4	Pre-samples/Method Development - 12 hrs/garment	12 hrs/garment * 1 garment * \$9.25 /hr	\$111.00
5	Source Trims	1.1 hrs * \$22.23 /hr	\$24.45
6	Sample Production - 53.45 hrs/garment	53.45 hrs/garment * 1 garment * \$9.25 /hr	\$494.41
7	Present Samples & Review	0.45 hrs * \$40/hr	\$18.00
8	Operations Garment Analysis	1.83 hrs * \$40 /hr	\$73.20
9	Review Data	0.5 hrs * \$40 /hr	\$20.00
		Total Cost	\$1119.06
		Units Produced Annually based on Contract	7,200
		Unit Cost	\$0.16

Spread, Cut and Bundle
Labor Hours collected from Cutting Operator's Log
*** Based on 1200 units cut.**

	Actual Minutes		Actual Minutes		Actual Minutes
Spread	65	Cut	35	Bundle	685.8
	10		40		
	110		45		
	5		40		
	100		80		
	20		10		
	75				
	55				
	40				
Total Minutes	480		250		685.8
Total Hours	8.00		4.17		11.43

Production Summary Tables

The following tables' information is based on the monthly reported sew hours and units.
The standard allowed minutes are based on MODAPTS, reference Appendix B –
MODAPTS reports.

Marine Short Sleeve Shirt					
Actual Sew Hours versus Standard Allowed Minutes					
Year 3 Total	Actual Hours	Units	Actual Minutes/Unit	Units/Hr	
Nov-97	464	957	29.0909	2.06	
Feb-98	173	367	28.2834	2.12	
Mar-98	160	173	55.4913	1.08	
May-98	124.5	132	56.5909	1.06	
Jul-98	1117.5	1459	45.9561	1.31	
Aug-98	63	70	54.0000	1.11	Units Per
Sep-98	864	623	83.2103	0.72	8 Hour Day
Totals/Weighted Average	2966	3781	47.0669	1.27	10.20
Standard Allowed Minutes			22.5167	2.66	21.32
Difference			-24.5502	1.39	11.12
% Efficiency			47.84%		
Period #1	Actual Hours	Units	Actual Minutes/Unit	Units/Hr	
Nov-97	464	957	29.0909	2.06	
Feb-98	173	367	28.2834	2.12	
Mar-98	160	173	55.4913	1.08	
May-98	124.5	132	56.5909	1.06	
Totals/Weighted Average	921.5	1629	33.9411	1.77	14.14
Standard Allowed Minutes			22.5167	2.66	21.32
Difference			-11.4244	0.90	7.18
% Efficiency			66.34%		
Period #2	Actual Hours	Units	Actual Minutes/Unit	Units/Hr	
Jul-98	1117.5	1459	45.9561	1.31	
Aug-98	63	70	54.0000	1.11	
Sep-98	864	623	83.2103	0.72	
Totals/Weighted Average	2044.5	2152	57.0028	1.05	8.42
Standard Allowed Minutes			22.5167	2.66	21.32
Difference			-34.4861	1.61	12.90
% Efficiency			39.50%		

Marine Short Sleeve Shirt - Direct & Indirect Labor Cost Table

Step	Cost Element	Calculation	Total Hrs/ Unit	Labor Rate	Costs/ Unit	Total Cost/ Unit
2.1	Plan & Initiate Production		0.0019 0.0003	\$22.23 \$23.81	\$0.05	\$0.05
1	Receive Order & Disburse information	0.08 [hrs/order] / 732 [units/order] =	0.0001	\$22.23	\$0.002	
2	Check Finished Goods Inventory	0.17 [hrs/order] / 732 [units/order] =	0.0002	\$22.23	\$0.005	
3	Check Raw Materials Inventory	(0.08 [hrs/item] * 6 [items]) / 732 [units/order] =	0.0007	\$22.23	\$0.016	
4	Order Raw Materials	(0.08 [hrs/item] * 6 [items]) / 1200 [units/materials order quantity] =	0.0004	\$22.23	\$0.009	
5	Create Cutting Ticket	0.33 [hrs/order] / 732 [units/order] =	0.0005	\$22.23	\$0.011	
6	Schedule Production	0.25 [hr/order] / 732 [units/order] =	0.0003	\$23.81	\$0.007	
2.2	Manage Raw Material Inventory		0.0054 0.0017	\$7.12 \$10.16	\$0.06	\$0.06
1	Receive Raw Materials & Inspect (includes GFM): - Order for 1200 shirts - 1.4 yards/shirt - 100 yards/roll, 71 shirts/roll - Receive 17 rolls/shipment	[(.08 hrs/item * 6 items) + (.17 hrs/roll * 17 rolls)] / 1200 units/shipment =	0.0028	\$7.12	\$0.020	
2	Stock	[(.08 hrs/item * 6 items) + (.08 hrs/roll * 9 rolls)] / 1200 units/shipment =	0.0010	\$7.12	\$0.007	
3	Inventory Log - GFM	(.08 hrs/roll * 17 rolls) / 1200 units/shipment =	0.0011	\$7.12	\$0.008	
4	Pull Raw Materials for Cutting - 1200 shirt batch size	(.06 hrs/roll * 17 rolls) / 1200 shirt batch size	0.0009	\$10.16	\$0.009	
5	Stock Cut Parts	1 hr / 1200 shirts	0.0008	\$10.16	\$0.008	
6	Pull Cut Parts & Trim for Sewing - 579 batch size based on actual Year 3 production	.28 hrs / 579 average batch size	0.0005	\$7.12	\$0.004	
2.3	Develop Patterns & Markers		0.0002	\$10.16	\$0.00	\$0.00
1	Print Markers	.20 hrs/cut / 1200 units	0.0002	\$10.16	\$0.002	
2.4	Spread, Cut and Bundle		0.0197	\$10.16	\$0.20	\$0.20
1	Spread	8 hrs / 1200 units	0.0067	\$10.16	\$0.068	
2	Cut	4.17 hrs / 1200 units	0.0035	\$10.16	\$0.036	
3	Bundle	11.43 hrs / 1200 units	0.0095	\$10.16	\$0.097	

2.5	Sew, Finish and Inspect		0.7864 0.0006	\$9.00 \$23.57	\$7.09	\$7.09
1	Work Cell Setup - Operator Labor, \$9/hr - Technician Labor, \$23.57/hr	(.33 hrs * 7 operators)/ 579 units (.33 hrs * 1 technician)/ 579 units	0.0019 0.0006	\$9.00 \$23.57	\$0.017 \$0.014	
2	Sew & Finish * Based on Year 3 Actual Average Minutes per Unit	47.07 min/unit * 1 hr/60 mins	0.7845	\$9.00	\$7.060	
2.6	Manage Finished Goods Inventory		0.0046 ---	\$7.12 \$0.03	\$0.07	\$0.07
1	Stock Finished Goods - 1.23 hours per 265 units (ave. stock quantity, see previous table)	1.23 hrs /265 Units Ordered in Year 3	0.0046	\$7.12	\$0.033	
2	Holding Cost - Container \$780/year	(\$780 * .15 space/container)/3660 Units	---	{ \$0.032 }	\$0.032	
2.7	Ship and Invoice		0.0843 0.0004 0.0005 0.0001	\$7.12 \$23.81 \$19.67 \$78.69	\$0.63	\$0.63
1	Pack & Complete Shipper Paperwork	0.0843 hrs/unit	0.0843	\$7.12	\$0.600	
2	Complete DD250	0.32 hrs/order / 732 ave. order qty.	0.0004	\$23.81	\$0.010	
3	Process DD250, 1 st Level	0.33 hrs /732	0.0005	\$19.67	\$0.010	
4	Process DD250, 2 nd Level	0.08 hrs / 732	0.0001	\$78.69	\$0.008	
	Totals	ATRC Director Production Manager Production Assistant Machine Technician Cutting Operator Sew Operator Production Manager Assistant Container Holding Cost	0.0001 0.0013 0.0019 0.0005 0.0216 0.7864 0.0943 -----	\$78.69 \$23.81 \$22.23 \$19.67 \$10.16 \$9.00 \$7.12 -----	\$0.008 \$0.031 \$0.042 \$0.010 \$0.219 \$7.078 \$0.671 \$0.032	\$8.10*
		Total			\$8.091	
*Totals different due to rounding.						

**Factory Hierarchy
Problems/ Solutions Summary Table**

<i>Plan and Initiate Production</i>			
	Problem	Solution	Reference Section
1	Inaccurate forecast and fluctuating order quantities.	Work with Item Manager to improve figures.	Section 2.1
2	Cal Poly Demo receives orders via multiple facsimiles & the order does not reach the production office immediately.	Implement EDI software and training.	Section 2.1
3	Inventory Log located in storage container and performed manually.	Maintain inventory accounting with software.	Section 2.1
<i>Manage Raw Material Inventory</i>			
	Problem	Solution	Reference Section
1	Fabric flaws encountered in both cutting and sewing. In cutting approximately 8% of a roll has fabric flaws. In sewing, an additional 7% of the fabric has "black threads" and requires a re-cut.	Implement procedures when initially receiving the fabric rolls.	Section 2.2
<i>Develop Patterns and Markers</i>			
	Problem	Solution	Reference Section
1	There is a pattern problem with the Marine shirt. The collar dimension does not match the markings on the part to which it is attached.	The Cal Poly Demo has contacted the Marine Corps pattern design department through the DSCP.	Section 2.3
<i>Spread, Cut and Bundle</i>			
	Problem	Solution	Reference Section
1	No problems encountered. The Cal Poly Demo plans to explore software for creating cutting tickets and automatically generating the bundle tickets.	---	Section 2.4
<i>Sew, Finish and Inspect</i>			
	Problem	Solution	Reference Section
1	Low Production Efficiencies	Institute Production Controls	Section 2.5
2	Due to the pattern problem of the collar dimension not matching the markings on the part to which it is attached, excessive time is spent in attaching the collar and wrinkling is occurring.	(As previously stated) The Cal Poly Demo has contacted the Marine Corps pattern design department through the DSCP.	Section 2.5
<i>Manage Finished Goods Inventory</i>			
	Problem	Solution	Reference Section
1	No problems.	---	Section 2.6
<i>Ship and Invoice</i>			
	Problem	Solution	Reference Section
1	The DD250 form software did not allow building an archive.	At the time of this report, the Cal Poly Demo received a newer version of the software, which allows archiving and doing "Save As".	Section 2.7

Adele Gasparro, 03:05 PM 1/16/98 , Re: MC SHIRTS



To: paa4119@dscpl.dia.mil (Adele Gasparro)
From: Paul Miner <pmminer@csupomona.edu>
Subject: Re: MC SHIRTS
Cc:
Bcc:

Hi Del,

Sorry I missed your call. We can start shipping 600 pieces per month of size 17 to San Diego beginning February 16th. Please advise what you would like to do.

At 04:04 PM 1/16/98 -0500, you wrote:

>Paul,
> I left a message for you to call me today but you haven't called and I am
>leaving and I know
>you will be out next week - ARN - San Diego.
>
>What are you doing on the Marine Corps S/S Shirts??? We stopped orders in Dec
>98 - should we start up again Size 17
>
>
>Please let me know, thanks, Del
>
>

Printed for Paul Miner <pmminer@csupomona.edu>

1

Appendix B

The following pages document the Standard Allowed Minutes (SAMS) used as a basis for evaluation of productivity in section 2.5 Sew, Finish and Inspect. The reports are from the TimeQuest for Apparel Manufacturing software program developed and distributed by:

Industrial Engineering Services, InTime Inc.
2400 East Rock Creek Road
New Bern, North Carolina 28562
Telephone: 252-637-2471

The TimeQuest for Apparel Manufacturing software outputs labor standards based on a database of pre-defined motions with assigned times for handling parts, aligning parts to needle, sewing, etc. The pre-defined motions are built using MODAPTS, Modular Arrangement of Pre-determined Time Standards, loaded within TimeQuest. To create labor standards TimeQuest combines a garment's specifications, such as seam length, with the pre-defined motion blocks.

Dependent on a plant's needs, TimeQuest outputs a variety of reports. For the Marine Short Sleeve Shirt the below reports are presented, respectively:

1. Part Workcenter Summary Report – Prints a summary of the operators' total time spent producing a garment. It incorporates a plant's Physical, Fatigue and Delay factor(s) (PF&D) and pay rate(s).

For the Marine Shirt the following PF&D factors are used:

<u>Sewing Operations</u> (Performed by Operators 1 – 6)	22%
- 10% for bobbin change and machine delays	
- 12% for fatigue breaks, Cal Poly Demo gives two – 20 minute breaks per 8 hour day	
<u>Finishing Operations</u> (Performed by Operators 7 – 9)	12%

Also, a pay rate of \$6.50 per hour is used.

2. Part Operation Summary Report – Prints a summary of each operation performed by a workcell's or production team's operators.
3. Part Variables Report – Prints a list of set parameters for a garment, such as stitches per inch.
4. Part Routing Report – Prints a list of all the operations performed for a garment, independent of operators, and breaks down each operation's labor standard by Setup, Handle and Process time, as defined below:
 - Setup Time: The time for the sewing machine and station to be prepared for production of a garment. (Note: For the Marine Shirt, the Cal Poly Demo to-date has not performed any setup time studies.)
 - Handle Time: The time for obtaining and staging cut parts and sub-assemblies at a work station.

- Process Time: The time spent processing a part or sub-assembly at a work station. Stated another way, this the time spent “adding value” to a garment.

Note: Each of the times defined above are calculated per garment.

5. Operator Reports – Prints the break down of the motion blocks used to create a labor standard for each operation. The report may be printed for multiple levels of detail. For the Marine Shirt, the Operator Report is printed at level three.

Apparel Technology Research Center

Date: October 7, 1998

Finishing Operations Marine Short Sleeve Shirt

- ▶ Press Operation (1.5489 mins)
 - Improvements:
 1. Do not have operator turn down collar b/c next operation must flip it up to inspect.
 2. Locate hangers next to iron boarding to eliminate 2 steps and reduce move value from M7.
- ▶ Inspect & Trim (1.6356 mins)
 - Improvements:
 1. Operators need to be trained to use one set method for checking garment.
 2. Need to feed garments directly from press to inspect & trim
- ▶ Fold & Bag (.8409 mins)
 - Improvements:
 1. Need to locate box for completed garments next to operator table or have operator stack several bagged garments and then, box the stack.
 2. Need to feed garments directly from trim & inspect. (Eliminate 12 steps.)

Part Routing Report

Monday, February 22, 1999 @ 9:00 PM

Page 1

Company **ATRC** APPAREL TECH. & RESEARCH CTR.

Plant **PLANT 01** PLANT 01

Part **M-SHORTSLEEVE** SHORT SLEEVE SHIRT

Operation	Setup	Handle	Process	Normal	PF&D	Incentive	Standard	Cost
PRESS SHIRT	0.0000	.0482	1.5007	1.5489	0.0 %		1.5489	\$0.23
INSPECT & TRIM MARINE SHIRT	0.0000	.0331	1.6026	1.6356	0.0 %		1.6356	\$0.25
PACKAGE SHIRT	0.0000	.0949	.7460	.8409	0.0 %		.8409	\$0.13
	0.0000	.1762	3.8493	4.0255			4.0255	\$0.60

Parts Per Minute

Parts Per 8 Hour Day

.2484
119.2405

Operator Report

Wednesday, October 28, 1998 @ 3:18 PM

Page 1

Company **ATRC** APPAREL TECH. & RESEARCH CTR.
 Plant **PLANT 01** PLANT 01
 Part **M-SHORTSLEEVE** SHORT SLEEVE SHIRT
 Component **SUVO-PSHIRT** PRESS SHIRT

Value	Standard Minutes
Standard	1.5489
	.0258

Code	Description	Time	Freq.	Occur.	Ext. Time
FMSS-HPRESS	HANDLE - STOCK & INITIAL OBTAIN SHIRT	0.04825	1.00	1.00	0.04825
FMSM-STG-25	STOCK STATION W/ GARMENTS	0.01170	1.00	1.00	0.01170
W5	WALK TO STOCK & RETURN TO STATION	0.01075	20.00	25.00	0.00660
M5G12	OBTAIN STACK OF GARMENTS	0.03655	1.00	25.00	0.00148
M7P5	PUT GARMENTS UNDER STATION	0.02580	1.00	25.00	0.00103
M7P0	STRAIGHTEN	0.01505	1.00	25.00	0.00060
M7G3 M7P0	OBTAIN GARMENT UNDER WORK STATION	0.03655	1.00	1.00	0.03655
FMSS-PRESS	PRESS MARINE SHORT SLEEVE SHIRT	1.50070	1.00	1.00	1.50070
M3G3	REGRAASP GARMENT AT FLAP/COLLAR	0.01290	1.00	1.00	0.01290
M5P2	PLACE GARMENT TO BOARD	0.01505	1.00	1.00	0.01505
M2P0	ADJUST GARMENT ON BOARD	0.00430	1.00	1.00	0.00430
FMSM-PFH	PRESS INSIDE LINING (LF & RT SIDE) & HEM	0.19135	1.00	1.00	0.19135
M4G1 M4P0	GET IRON & PUT TO INSIDE FLAP	0.01935	1.00	1.00	0.01935
M5P2	PRESS INSIDE LINING FROM HEM TO COLLAR	0.01505	1.00	1.00	0.01505
M5P2	PRESS INSIDE LINING FROM COLLAR TO HEM	0.01505	1.00	1.00	0.01505
FMSM-PHEM	PRESS HEM PERIMETER	0.12900	1.00	1.00	0.12900
M4P2	ASIDE IRON TO PAD	0.01290	1.00	1.00	0.01290
FMSM-PFRT	PRESS RIGHT FRONT PANEL & SIDE SEAM	0.22360	1.00	1.00	0.22360
SUVE-OOT-FM	OBTAIN GARMENT W/ BH	0.02580	1.00	1.00	0.02580
M5P0	LIFT FROM BOARD	0.01075	1.00	1.00	0.01075
M5P2	POSITION TO BOARD	0.01505	1.00	1.00	0.01505

Company **ATRC** APPAREL TECH. & RESEARCH CTR.
 Plant **PLANT 01** PLANT 01
 Part **M-SHORTSLEEVE** SHORT SLEEVE SHIRT
 Component **SUVO-PSHIRT** PRESS SHIRT

M4G1 M4P0	GET IRON & PLACE TO GARMENT	0.01935	1.00	1.00	0.01935
FMSE-PH	PRESS FRONT UNDER POCKET	0.01075	2.00	1.00	0.02150
FMSE-PH	PRESS BETWEEN BUTTONS	0.01075	4.00	1.00	0.04300
FMSE-PH	PRESS OVER POCKET	0.01075	1.00	1.00	0.01075
FMSE-PH	PRESS ALONG SLEEVE SEAM	0.01075	2.00	1.00	0.02150
M3P0	ADJUST GARMENT ON BOARD	0.00645	1.00	1.00	0.00645
FMSE-PA	PRESS FRONT AT BASE OF GARMENT	0.01505	1.00	1.00	0.01505
FMSE-PH	PRESS FRONT AT SIDE SEAM	0.01075	2.00	1.00	0.02150
M4P2	ASIDE IRON TO PAD	0.01290	1.00	1.00	0.01290
FMSM-PBACK	PRESS BACK PANEL	0.16555	1.00	1.00	0.16555
M4G0	PUT LH TO GARMENT	0.00860	1.00	1.00	0.00860
M4P0	PUSH GARMENT ON BOARD	0.00860	3.00	1.00	0.02580
M4G1 M4P2	GET IRON & PLACE TO BACK SEAM	0.02365	1.00	1.00	0.02365
FMSE-PH	PRESS SEAM	0.01075	3.00	1.00	0.03225
M3P0	LIFT IRON	0.00645	1.00	1.00	0.00645
M3P0	PUSH GARMENT ACROSS BOARD	0.00645	3.00	1.00	0.01935
M3P2	PLACE IRON TO 2ND HALF OF SEAM	0.01075	1.00	1.00	0.01075
FMSE-PH	PRESS 2ND HALF OF SEAM	0.01075	3.00	1.00	0.03225
M3P0	ASIDE IRON TO BOARD	0.00645	1.00	1.00	0.00645
FMSM-PSS	PRESS SIDE SEAM	0.07095	1.00	1.00	0.07095
M3G0	PLACE LH TO GARMENT	0.00645	1.00	1.00	0.00645
M3P0	ADJUST GARMENT ON BOARD	0.00645	1.00	1.00	0.00645
M3P2	POSITION SIDE SEAM TO BOARD	0.01075	1.00	1.00	0.01075
M3G1 M3P2	GET IRON & PUT TO SIDE SEAM	0.01935	1.00	1.00	0.01935
FMSE-PH	PRESS SIDE SEAM	0.01075	2.00	1.00	0.02150
M3P0	ASIDE IRON TO BOARD	0.00645	1.00	1.00	0.00645
FMSM-PFRTL	PRESS LEFT FRONT PANEL ONLY	0.14620	1.00	1.00	0.14620
M3G1 M2P0	GRASP GARMENT EDGE W/ LH & LIFT	0.01290	1.00	1.00	0.01290
M2G1	GRASP GARMENT W/ RH	0.00645	1.00	1.00	0.00645
M3P0	LIFT FROM BOARD	0.00645	2.00	1.00	0.01290

Company **ATRC** APPAREL TECH. & RESEARCH CTR.
 Plant **PLANT 01** PLANT 01
 Part **M-SHORTSLEEVE** SHORT SLEEVE SHIRT
 Component **SUVO-PSHIRT** PRESS SHIRT

M3P2	POSITION ON BOARD TO IRON LF FRONT PANEL	0.01075	1.00	1.00	0.01075
M3G1 M3P0	GET IRON & PLACE TO GARMENT	0.01505	1.00	1.00	0.01505
FMSE-PH	PRESS FRONT	0.01075	4.00	1.00	0.04300
FMSE-PH	PRESS OVER POCKET	0.01075	1.00	1.00	0.01075
FMSE-PH	PRESS ALONG SLEEVE SEAM	0.01075	2.00	1.00	0.02150
M4P2	ASIDE IRON TO PAD	0.01290	1.00	1.00	0.01290
FMSM-PSLV	PRESS LF SLEEVE	0.16555	1.00	1.00	0.16555
SUVE-OOT-FM	RE-GRASP GARMENT	0.02580	1.00	1.00	0.02580
MSP0	LIFT FROM BOARD	0.01075	1.00	1.00	0.01075
J2	RE-GRASP SLEEVE	0.00430	1.00	1.00	0.00430
MSP0	PLACE GARMENT TO BOARD	0.01075	1.00	1.00	0.01075
J2	RE-GRASP SLEEVE	0.00430	1.00	1.00	0.00430
M1P2	ADJUST TO IRON	0.00645	2.00	1.00	0.01290
M4G1 M4P2	GET IRON & PUT TO SLEEVE	0.02365	1.00	1.00	0.02365
FMSE-PH	PRESS SLEEVE	0.01075	4.00	1.00	0.04300
M4P2	ASIDE IRON TO PAD	0.01290	1.00	1.00	0.01290
M4G3 M1P0	GRASP SLEEVE & OPEN	0.01720	1.00	1.00	0.01720
FMSM-PSLV	PRESS RT SLEEVE	0.16555	1.00	1.00	0.16555
FMSM-PCLR	PRESS COLLAR	0.13545	1.00	1.00	0.13545
SUVE-OOT-FM	RE-GRASP GARMENT	0.02580	1.00	1.00	0.02580
MSP0	LIFT FROM BOARD	0.01075	1.00	1.00	0.01075
MSP2	PLACE GARMENT TO BOARD	0.01505	1.00	1.00	0.01505
M4G1 M4P0	GET IRON & PUT TO COLLAR	0.01935	1.00	1.00	0.01935
FMSE-PA	PRESS COLLAR ALONG WIDTH	0.01505	2.00	1.00	0.03010
FMSE-PH	PRESS COLLAR AT TIP	0.01075	2.00	1.00	0.02150
M4P2	ASIDE IRON TO PAD	0.01290	1.00	1.00	0.01290
M4G0 M4P0	PLACE HAND & ADJUST GARMENT ON BOARD	0.01720	1.00	1.00	0.01720
FMSM-HSH	HANG SHIRT & RETURN TO IRONING BOARD	0.18705	1.00	1.00	0.18705
W5	TURN	0.01075	1.00	1.00	0.01075
M7G3 M7P0	OBTAIN HANGER FROM BOX ON FLOOR	0.03655	1.00	1.00	0.03655

Company **ATRC** APPAREL TECH. & RESEARCH CTR.
 Plant **PLANT 01** PLANT 01
 Part **M-SHORTSLEEVE** SHORT SLEEVE SHIRT
 Component **SUVO-PSHIRT** PRESS SHIRT

W5	STEP BACK TO STATION	0.01075	1.00	1.00	0.01075
M2G1 M2P2	GRASP GARMENT & POSITION HANGER	0.01505	1.00	1.00	0.01505
M2P0	POSITION GARMENT ON HANGER	0.00430	1.00	1.00	0.00430
J2	REGRASP GARMENT ON HANGER	0.00430	1.00	1.00	0.00430
M3G1	GRASP RH SIDE OF GARMENT	0.00860	1.00	1.00	0.00860
M3P2	POSITION RT SIDE OF GARMENT OVER HANGER	0.01075	1.00	1.00	0.01075
J2	REGRASP GARMENT	0.00430	1.00	1.00	0.00430
M2P0	ADJUST ON HANGER	0.00430	1.00	1.00	0.00430
M3P2	POSITION HANGER TO MOUTH	0.01075	1.00	1.00	0.01075
M1P0	CLOSE TEETH TO HOLD HANGER	0.00215	1.00	1.00	0.00215
M3G1	GRASP COLLAR W/ BH	0.00860	1.00	1.00	0.00860
M2P5	TURN COLLAR OVER	0.01505	1.00	1.00	0.01505
M3G1	RE-GRASP HANGER	0.00860	1.00	1.00	0.00860
M1P0	OPEN MOUTH TO RELEASE HOLD	0.00215	1.00	1.00	0.00215
W5	STEP	0.01075	1.00	1.00	0.01075
M2P2	ASIDE GARMENT TO RACK	0.00860	1.00	1.00	0.00860
W5	STEP BACK TO WORK STATION	0.01075	1.00	1.00	0.01075

Operator Report

Wednesday, October 28, 1998 @ 3:20 PM

Page 1

Company **ATRC** APPAREL TECH. & RESEARCH CTR.
 Plant **PLANT 01** PLANT 01
 Part **M-SHORTSLEEVE** SHORT SLEEVE SHIRT
 Component **SUVO-INS&TRIM** INSPECT & TRIM MARINE SHIRT

Value	Standard Minutes
Standard	1.6356
	.0273

Code	Description	Time	Freq.	Occur.	Ext. Time
FMSS-HTRIM	HANDLE - STOCK TRIM STATION W/ GARMENTS	0.03306	1.00	1.00	0.03306
FMSM-STG-8	STOCK GARMENTS TO STATION (8 PER STOCK)	0.03306	1.00	1.00	0.03306
W3	WALK TO PRESS AREA & RETURN	0.01075	20.00	8.00	0.02687
M5G8	GRASP ARMFUL OF GARMENTS	0.02795	1.00	8.00	0.00349
M3P0	LIFT FROM RACK	0.00645	1.00	8.00	0.00061
MSP2	PUT STACK OF GARMENTS TO STATION	0.01505	1.00	8.00	0.00188
FMSS-TRIM	INSPECT & TRIM MARINE SHORT SLEEVE SHIRT	1.60256	1.00	1.00	1.60256
M2G1	GET SCISSORS (SNIPS) FROM TABLE	0.00645	1.00	1.00	0.00645
FMSM-TPCK	INSPECT & TRIM OUTSIDE 1ST POCKET	0.08385	1.00	1.00	0.08385
M3G3 M1P0	GRASP GARMENT & LIFT	0.01505	1.00	1.00	0.01505
SUVE-CCS-W	1ST CLIP ON FLAP, 1ST SIDE	0.02150	1.00	1.00	0.02150
SUVE-CCS-F	2ND CLIP ON FLAP, 1ST SIDE	0.01505	1.00	1.00	0.01505
M2G3 M1P0	GRASP GARMENT & LIFT	0.01290	1.00	1.00	0.01290
SUVE-CCS-A	3RD CLIP ON FLAP, 2ND SIDE	0.01935	1.00	1.00	0.01935
FM9M-TPCK	INSPECT & TRIM OUTSIDE 2ND POCKET	0.08385	1.00	1.00	0.08385
FMSM-ITCLR	INSPECT & TRIM COLLAR OUTSIDE & INSIDE	0.29455	1.00	1.00	0.29455
M3G3 M2P2	GRASP COLLAR & FLIP UP	0.02150	1.00	1.00	0.02150
E2	INSPECT COLLAR (ALONG OUTER SEAM) 4 LOCS	0.00430	4.00	1.00	0.01720
M3G3 M1P0	GRASP COLLAR & LIFT (AVE 3 CLIPS)	0.01505	3.00	1.00	0.04515
SUVE-CCS-A	CLIP THREAD AT OUTER COLLAR SEAM (AVE 3 CLIPS)	0.01935	3.00	1.00	0.05805
M3P5	FLIP COLLAR BACK	0.01720	1.00	1.00	0.01720

Company **ATRC** APPAREL TECH. & RESEARCH CTR.
 Plant **PLANT 01** PLANT 01
 Part **M-SHORTSLEEVE** SHORT SLEEVE SHIRT
 Component **SUVO-INS&TRIM** INSPECT & TRIM MARINE SHIRT

M3G3 M3P0	GRASP GARMENT LINING & OPEN (2 SIDES)	0.01935	2.00	1.00	0.03870
M3G3 M1P0	GRASP & LIFT GARMENT FOR NEXT 3 CLIPS	0.01505	3.00	1.00	0.04515
SUVE-CCS-H	CLIP THREAD AT COLLAR TACKING, 1ST SIDE	0.01720	1.00	1.00	0.01720
SUVE-CCS-H	CLIP THREAD AT COLLAR LABEL	0.01720	1.00	1.00	0.01720
SUVE-CCS-H	CLIP THREAD AT COLLAR TACKING, 2ND SIDE	0.01720	1.00	1.00	0.01720
FMSM-TPCKI	INSPECT & TRIM INSIDE 1ST POCKET	0.07310	1.00	1.00	0.07310
M3G3 M2P0	GRASP FLAP & OPEN	0.01720	1.00	1.00	0.01720
M2G3 M1P0	GRASP GARMENT & LIFT	0.01290	1.00	1.00	0.01290
SUVE-CCS-A	1ST CLIP THREAD	0.01935	1.00	1.00	0.01935
SUVE-CCS-F	2ND CLIP THREAD	0.01505	1.00	1.00	0.01505
J2	REGRASP FLAP	0.00430	1.00	1.00	0.00430
M2P0	CLOSE FLAP	0.00430	1.00	1.00	0.00430
FMSM-TPCKI	INSPECT & TRIM INSIDE 2ND POCKET	0.07310	1.00	1.00	0.07310
FMSM-ITSLV	INSPECT & TRIM 1ST SLEEVE	0.06235	1.00	1.00	0.06235
M3G3 M2P0	GRASP SLEEVE & OPEN TO INNER SEAM	0.01720	1.00	1.00	0.01720
M2G1	RE-GRASP SLEEVE AT SEAM TO SNIP	0.00845	1.00	1.00	0.00845
SUVE-CCS-F	CLIP THREAD (2 TIMES)	0.01505	2.00	1.00	0.03010
J2	REGRASP SLEEVE	0.00430	1.00	1.00	0.00430
M2P0	ASIDE SLEEVE	0.00430	1.00	1.00	0.00430
FMSM-ITSLV	INSPECT & TRIM 2ND SLEEVE	0.06235	1.00	1.00	0.06235
FMSM-ITBTN-5	INSPECT & TRIM 5 BUTTONS ON SHIRT	0.06343	1.00	1.00	0.06343
E2	INSPECT	0.00430	5.00	1.00	0.02150
M2G3 M1P0	GRASP BUTTON & LIFT TO TRIM (AVE 1.5 BUTTONS)	0.01290	1.50	1.00	0.01935
SUVE-CCS-F	CLIP THREAD (AVE 1.5 BUTTONS)	0.01505	1.50	1.00	0.02258
M4P0	ASIDE SCISSORS	0.00860	1.00	1.00	0.00860
M2G1 M4P0	OBTAIN BUTTON TOOL & BRING TO FRONT	0.01505	1.00	1.00	0.01505
SUVE-CBTN	CLOSE 5 BUTTONS ON PLACKET W/ TOOL	0.08170	5.00	1.00	0.40850
M2P2	POSITION TOOL TO BUTTON HOLE	0.00860	1.00	1.00	0.00860
X4	EXTRA FORCE	0.00860	1.00	1.00	0.00860
M2P0	INSERT TOOL THRU HOLE	0.00430	1.00	1.00	0.00430

Company **ATRC** APPAREL TECH. & RESEARCH CTR.
 Plant **PLANT 01** PLANT 01
 Part **M-SHORTSLEEVE** SHORT SLEEVE SHIRT
 Component **SUVO-INS&TRIM** INSPECT & TRIM MARINE SHIRT

M3G3 M2P5	GRASP BUTTON ON GARMENT & POS TO TOOL	0.02795	1.00	1.00	0.02795
M2P2	PULL BUTTON TO HOLE W/ TOOL	0.00860	1.00	1.00	0.00860
X4	PULL BUTTON THRU HOLE	0.00860	1.00	1.00	0.00860
M1P0	SLIDE TOOL	0.00215	1.00	1.00	0.00215
M1P5	REMOVE TOOL FROM BUTTON	0.01290	1.00	1.00	0.01290
SUVE-CBTN	CLOSE BUTTON ON 1ST POCKET W/ TOOL	0.08170	1.00	1.00	0.08170
SUVE-CBTN	CLOSE BUTTON ON 2ND POCKET W/ TOOL	0.08170	1.00	1.00	0.08170
M4P0	ASIDE BUTTON TOOL	0.00860	1.00	1.00	0.00860
M2G1 M4P0	OBTAIN SCISSORS & BRING TO FRONT	0.01505	1.00	1.00	0.01505
SUVE-CCS-F	CLIP THREAD ON POCKET BUTTONS (1/8 OCC)	0.01505	1.00	8.00	0.00188
M4P0	ASIDE SCISSORS	0.00860	1.00	1.00	0.00860
M4G3	GRASP GARMENT	0.01505	1.00	1.00	0.01505
W5	STEP	0.01075	1.00	1.00	0.01075
M3P0	SHAKE GARMENT TO REMOVE THREADS	0.00645	3.00	1.00	0.01935
W5	STEP TO STATION	0.01075	1.00	1.00	0.01075
SUVE-CCS-H	CLIP THREADS (2 ADDITIONAL)	0.01720	2.00	1.00	0.03440
M3G3 M1P0	GRASP GARMENT & LIFT FOR 2 ADD'T CLIPS	0.01505	2.00	1.00	0.03010
E2	INSPECT GARMENT(HEM, FRONT, SLEEVE)	0.00430	4.00	1.00	0.01720
W5	STEP	0.01075	1.00	1.00	0.01075
M5P0	ASIDE GARMENT TO STACK	0.01075	1.00	1.00	0.01075
W5	STEP BACK TO STATION	0.01075	1.00	1.00	0.01075

Operator Report

Wednesday, October 28, 1998 @ 3:12 PM

Page 1

Company **ATRC** APPAREL TECH. & RESEARCH CTR.
 Plant **PLANT 01** PLANT 01
 Part **NONE** None Selected
 Component **SUVO-PKGSHIRT** PACKAGE SHIRT

Value	Standard Minutes
Standard	.8409
	.0140

Code	Description	Time	Freq.	Occur.	Ext. Time
FMSS-HFOLDBG	HANDLE-REMOVE HANGER & PUT SHIRT TO STATION	0.09487	1.00	1.00	0.09487
SUVM-SRHG-8	STOCK & REMOVE HANGERS FROM 8 GARMENTS	0.06262	1.00	1.00	0.06262
W5	WALK TO STOCK & RETURN TO STATION	0.01075	12.00	8.00	0.01613
M5G8	OBTAIN STACK OF GARMENTS	0.02795	1.00	8.00	0.00349
M5P2	PUT STACK TO STATION	0.01505	1.00	8.00	0.00188
SUVM-RHGR	REMOVE HANGER PER GARMENT	0.02580	1.00	1.00	0.02580
W5	WALK TO HANGER STOCK BOX & RETURN	0.01075	10.00	8.00	0.01344
M5P2	ASIDE HANGERS TO BOX	0.01505	1.00	8.00	0.00188
M2G3	GRASP GARMENT ON STACK	0.01075	1.00	1.00	0.01075
W5	STEP TO WORKSTATION	0.01075	1.00	1.00	0.01075
M5P0	PLACE GARMENT ON STATION	0.01075	1.00	1.00	0.01075
FMSS-FOLDBAG	FOLD & BAG MARINE SHORT SLEEVE SHIRT	0.74605	1.00	1.00	0.74605
M4G1 M2P0	RE-GRASP & PULL TO STRAIGHTEN (2 LOCs)	0.01505	2.00	1.00	0.03010
M3G3 M3P2	FOLD AT SHOULDER (2 SIDES)	0.02365	2.00	1.00	0.04730
J2	RE-GRASP (2 SIDES)	0.00430	2.00	1.00	0.00860
M2P0	PULL TO STRAIGHTEN (2 SIDES)	0.00430	2.00	1.00	0.00860
M4G0 M4P0	SMOOTH AT CREASE (2 SIDES)	0.01720	2.00	1.00	0.03440
M3G1 M2P2	GRASP SLEEVE & FOLD OVER (2 SIDES)	0.01720	2.00	1.00	0.03440
J2	RE-GRASP (2 SIDES)	0.00430	2.00	1.00	0.00860
M2P0	PULL TO STRAIGHTEN (2 SIDES)	0.00430	2.00	1.00	0.00860
M2G0 M2P0	SMOOTH AT CREASE (2 SIDES)	0.00880	2.00	1.00	0.01720

Company **ATRC** APPAREL TECH. & RESEARCH CTR.
 Plant **PLANT 01** PLANT 01
 Part **NONE** None Selected
 Component **SUVO-PKGSHIRT** PACKAGE SHIRT

M3G0 M3P0	PLACE HANDS & PRESS TO HOLD FOLD (3 LOCS)	0.01200	3.00	1.00	0.03870
M4G3 M3P2	GRASP AT BASE & MAKE SMALL FOLD	0.02580	1.00	1.00	0.02580
M3G3 M4P2	RE-GRASP AT BASE & MAKE LARGE FOLD	0.02580	1.00	1.00	0.02580
M2G0 M1P0	PLACE HANDS & PRESS TO SECURE FOLDS	0.00645	1.00	1.00	0.00645
M3P0	TURN GARMENT	0.00645	1.00	1.00	0.00645
M5G3	OBTAIN 1ST CLIP	0.01720	1.00	1.00	0.01720
M1G1	OBTAIN 2ND CLIP	0.00430	1.00	1.00	0.00430
M5G3	GRASP GARMENT AT FOLD	0.01720	1.00	1.00	0.01720
M2P5	POSITION 1ST CLIP TO GARMENT	0.01505	1.00	1.00	0.01505
M1P0	INSERT OVER GARMENT TO HOLD FOLD	0.00215	1.00	1.00	0.00215
M3G3	GRASP GARMENT AT 2ND FOLD	0.01290	1.00	1.00	0.01290
J2	RE-GRASP 2ND CLIP	0.00430	1.00	1.00	0.00430
M2P5	POSITION 2ND CLIP TO GARMENT	0.01505	1.00	1.00	0.01505
M1P0	INSERT TO HOLD FOLD	0.00215	1.00	1.00	0.00215
M2G1 M3P0	RE-GRASP GARMENT & TURN OVER	0.01290	1.00	1.00	0.01290
M3G0 M1P0	PLACE HANDS & PRESS TO HOLD FOLD	0.00860	2.00	1.00	0.01720
PM8M-BAG	BAG SHIRT	0.27520	1.00	1.00	0.27520
M4G3 M4P0	GRASP BAG & BRING TO FRONT	0.02365	1.00	1.00	0.02365
M2G3	GRASP BAG W/ OTHER HAND	0.01075	1.00	1.00	0.01075
M2P0	PULL BAG OPEN	0.00430	2.00	1.00	0.00860
J2	RE-GRASP	0.00430	1.00	1.00	0.00430
M3P0	INSERT HAND TO OPEN BAG COMPLETELY	0.00645	3.00	1.00	0.01935
J2	SHAKE HAND TO OPEN BAG FURTHER	0.00430	2.00	1.00	0.00860
M3P0	PULL OUT HAND	0.00645	1.00	1.00	0.00645
M2G1	REGRASP BAG W/ BH	0.00645	1.00	1.00	0.00645
M3P5	POSITION BAG TO SHIRT, 1ST CORNER	0.01720	1.00	1.00	0.01720
M3P5	POSITION BAG TO SHIRT, 2ND CORNER	0.01720	1.00	1.00	0.01720
M2P2	PULL BAG OVER SHIRT	0.00860	3.00	1.00	0.02580
M2G3 M2P2	GRASP COLLAR & POSITION IN BAG	0.01935	1.00	1.00	0.01935
M2G1	REGRASP BAG	0.00645	1.00	1.00	0.00645

Company **ATRC** APPAREL TECH. & RESEARCH CTR.
 Plant **PLANT 01** PLANT 01
 Part **NONE** None Selected
 Component **SUVO-PKGSHIRT** PACKAGE SHIRT

M2P2	PULL OVER COLLAR	0.00860	2.00	1.00	0.01720
M3P0	LIFT BAG	0.00645	1.00	1.00	0.00645
J2	SHAKE TO INSERT SHIRT	0.00430	2.00	1.00	0.00860
M3P0	PUT BAGGED SHIRT TO TABLE	0.00645	1.00	1.00	0.00645
M3G3	RE-GRASP BAG TO CLOSE - LH	0.01290	1.00	1.00	0.01290
M2G3	RE-GRASP BAG TO CLOSE - RH	0.01075	1.00	1.00	0.01075
M3P0	TURN BAG OVER	0.00645	1.00	1.00	0.00645
J2	ADJUST FINGERS	0.00430	1.00	1.00	0.00430
M2P5	CLOSE FLAP	0.01505	1.00	1.00	0.01505
J2	RE-GRASP	0.00430	1.00	1.00	0.00430
M4P0	FLIP BAG & DROP TO TABLE	0.00860	1.00	1.00	0.00860
M3G1	GRASP BAGGED SHIRT	0.00860	1.00	1.00	0.00860
W5	STEP TO BOX	0.01075	2.00	1.00	0.02150
M2P2	ASIDE BAGGED SHIRT	0.00860	1.00	1.00	0.00860
W5	STEP TO NEXT GARMENT	0.01075	1.00	1.00	0.01075

Part Workcenter Summary Report

Wednesday, April 21, 1999 @ 9:57 PM

Page 1

Company **ATRC** APPAREL TECH. & RES. CTR
 Plant **CAL POLY POMONA** CAL POLY POMONA
 Part: **MARINE SS SHIRT** MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Workcenter	Normal Minutes	PF & D Incentive	Std. Minutes	Cost
Material Group MARINE CORP KHAKI POLY/WOOL BLEND				\$2.44
C'S TEAM, OPERATOR #1	4.7160	22.0 %	5.7535	\$0.62
C'S TEAM, OPERATOR #2	1.7452	22.0 %	2.1292	\$0.23
C'S TEAM, OPERATOR #3	2.1904	22.0 %	2.6722	\$0.29
C'S TEAM, OPERATOR #4	1.6516	22.0 %	2.0150	\$0.22
C'S TEAM, OPERATOR #5	1.6990	22.0 %	2.0728	\$0.22
C'S TEAM, OPERATOR #6	2.7586	22.0 %	3.3655	\$0.36
C'S TEAM, OPERATOR #7	1.5489	12.0 %	1.7348	\$0.19
C'S TEAM, OPERATOR #8	1.6356	12.0 %	1.8319	\$0.20
C'S TEAM, OPERATOR #9	.8409	12.0 %	.9418	\$0.10
Total Minutes	18.7863		22.5167	\$2.44
Total Hours	.3131		.3753	

Part Operation Summary Report

Wednesday, April 21, 1999 @ 10:03 PM

Page 1

Company **ATRC** APPAREL TECH. & RES. CTR
 Plant **CAL POLY POMONA** CAL POLY POMONA
 Part **MARINE SS SHIRT** MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Workcenter/Operation	Normal Minutes	Std. Minutes	Cost
Material Group MARINE CORP KHAKI POLY/WOOL BLEND			\$2.44
C'S TEAM, OPERATOR #1 PF&D 22.0%			
HEM 2 SLEEVES, MARINE SHORT SLEEVE	.7053	.8604	\$0.09
JOIN AND TOPSTITCH YOKE	.9782	1.1935	\$0.13
PROFILE STITCH POCKET FLAPS	.3449	.4207	\$0.05
PROFILE STITCH COLLAR, AUTOMATIC	.6342	.7738	\$0.08
TURN COLLARS ON AUTOMATIC EQUIPMENT	.4475	.5459	\$0.06
TOPSTITCH COLLAR	.8378	1.0221	\$0.11
TOPSTITCH POCKET FLAPS	.4668	.5695	\$0.06
TURN 2 POCKET FLAPS	.3013	.3676	\$0.04
C'S TEAM, OPERATOR #2 PF&D 22.0%			
DOUBLE NEEDLE HEM 2 POCKETS	.2571	.3136	\$0.03
OVERLOCK LINER TO 2 FRONT FACINGS	1.1078	1.3515	\$0.15
DURKOFF POCKET SET	.3804	.4641	\$0.05
C'S TEAM, OPERATOR #3 PF&D 22.0%			
ATTACH FLAPS TO SHIRT POCKET	1.1842	1.4447	\$0.16
JOIN SHOULDER & TOPSTITCH SHOULDERS, 8" SEAMS	1.0061	1.2275	\$0.13
C'S TEAM, OPERATOR #4 PF&D 22.0%			
SET SLEEVE AND SIDESEAM	1.6516	2.0150	\$0.22
C'S TEAM, OPERATOR #5 PF&D 22.0%			
ATTACH COLLAR	1.6990	2.0728	\$0.22
C'S TEAM, OPERATOR #6 PF&D 22.0%			
SEW 5 BUTTONHOLES TO FRONT, 2 TO POCKETS	.6122	.7469	\$0.08
SEW 5 BUTTONS TO FRONT, 2 BUTTONS TO POCKETS	.6854	.8362	\$0.09
SHIRTTAIL HEM BOTTOM	1.2271	1.4971	\$0.16
TACK SEAM DOWN ON SLEEVE SEAMS	.2338	.2852	\$0.03
C'S TEAM, OPERATOR #7 PF&D 12.0%			
PRESS, MARINE SHORT SLEEVE	1.5489	1.7348	\$0.19
C'S TEAM, OPERATOR #8 PF&D 12.0%			
INSPECT, BUTTON & TRIM MARINE SHORT SLEEVE	1.6356	1.8319	\$0.20
C'S TEAM, OPERATOR #9 PF&D 12.0%			
FOLD AND BAG, MARINE SHORT SLEEVE	.8409	.9418	\$0.10
Total Minutes	18.7863	22.5167	\$2.44
Total Hours	.3131	.3753	

Part Variables Report

Wednesday, April 21, 1999 @ 10:32 PM

Page 1

Code **MARINE SS SHIRT** MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Type **PART** Part

Variable	Description	Value
U-BNDL-Q	Average number pieces per bundle	15.00
U-SPIN-N	Stitches per inch	14.00

Part Routing Report

Wednesday, June 09, 1999 @ 3:03 PM

Page 1

Company ATRC APPAREL TECH. & RES. CTR

Plant CAL POLY POMONA CAL POLY POMONA

Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Operation	Setup	Handle	Process	Normal	PF&D	Incentive	Standard	Cost
HEM 2 SLEEVES, MARINE SHORT SLEEVE	0.0000	.0043	.7010	.7053	22.0 %		.8604	\$0.09
JOIN AND TOPSTITCH YOKE	0.0000	.0043	.9739	.9782	22.0 %		1.1935	\$0.13
PROFILE STITCH POCKET FLAPS	0.0000	.0331	.3118	.3449	22.0 %		.4207	\$0.05
PROFILE STITCH COLLAR, AUTOMATIC	0.0000	.4429	.1913	.6342	22.0 %		.7738	\$0.08
TURN COLLARS ON AUTOMATIC EQUIPMENT	0.0000	.0089	.4386	.4475	22.0 %		.5459	\$0.06
TOPSTITCH COLLAR	0.0000	.0264	.8114	.8378	22.0 %		1.0221	\$0.11
TOPSTITCH POCKET FLAPS	0.0000	.0043	.4825	.4668	22.0 %		.5695	\$0.06
TURN 2 POCKET FLAPS	0.0000	.0089	.2924	.3013	22.0 %		.3676	\$0.04
DOUBLE NEEDLE HEM 2 POCKETS	0.0000	.0221	.2350	.2571	22.0 %		.3136	\$0.03
OVERLOCK LINER TO 2 FRONT FACINGS	0.0000	.0139	1.0939	1.1078	22.0 %		1.3515	\$0.15
DURKOFF POCKET SET	0.0000	.0149	.3655	.3804	22.0 %		.4641	\$0.05
ATTACH FLAPS TO SHIRT POCKET	0.0000	.0089	1.1753	1.1842	22.0 %		1.4447	\$0.16
JOIN SHOULDER & TOPSTITCH SHOULDERS, 8" SE	0.0000	.0089	.1973	1.0061	22.0 %		1.2275	\$0.13
SET SLEEVE AND SIDESEAM	0.0000	.0110	.8460	1.6516	22.0 %		2.0150	\$0.22
ATTACH COLLAR	0.0000	.0125	1.6866	1.6990	22.0 %		2.0728	\$0.22
SEW 5 BUTTONHOLES TO FRONT, 2 TO POCKETS	0.0000	.0110	.6012	.6122	22.0 %		.7469	\$0.08
SEW 5 BUTTONS TO FRONT, 2 BUTTONS TO POCKE	0.0000	.0110	.6744	.6854	22.0 %		.8362	\$0.09
SHIRTTAIL HEM BOTTOM	0.0000	.0175	1.2097	1.2271	22.0 %		1.4971	\$0.16
TACK SEAM DOWN ON SLEEVE SEAMS	0.0000	.0110	.2228	.2338	22.0 %		.2852	\$0.03
PRESS, MARINE SHORT SLEEVE	0.0000	0.0000	1.5489	1.5489	12.0 %		1.7348	\$0.19
INSPECT, BUTTON & TRIM MARINE SHORT SLEEVE	0.0000	0.0000	1.6356	1.6356	12.0 %		1.8319	\$0.20
FOLD AND BAG, MARINE SHORT SLEEVE	0.0000	0.0000	.8409	.8409	12.0 %		.9418	\$0.10
	0.0000	.6758	16.5158	18.7863			22.5167	\$2.44

Parts Per Minute

Parts Per 8 Hour Day

.0444

21.3175

Operator Report

Wednesday, April 21, 1999 @ 9:43 PM

Page 1

Company ATRC APPAREL TECH. & RES. CTR
 Plant CAL POLY POMONACAL POLY POMONA
 Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT
 Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Value
 Standard 0.0000
 Standard Hours 0.0000

Code	Description	Time	Freq.	Occur.	Ext. Time
• SATO-PROFLAP	PROFILE STITCH POCKET FLAPS	0.34486	1.00	1.00	0.34486
SATS-PSFLAP	PROFILE STITCH 1 POCKET FLAP WITH LINER	0.31175	1.00	1.00	0.31175
M4G3	RH GRASP TOP FLAP PLY	0.01505	2.00	1.00	0.03010
M2G3 M2P0	LH GRASP TOP PLY	0.01505	2.00	1.00	0.03010
J2	BH REGRASP TOP PLY	0.00430	2.00	1.00	0.00860
M1G3 M1P0	LH GRASP AND LIFT 2ND PLY	0.01075	2.00	1.00	0.02150
M1G1 M1P0	RH GRASP AND LIFT 2ND PLY	0.00645	2.00	1.00	0.01290
M1P5	MINOR ALIGN PLYS TOGETHER	0.01260	2.00	1.00	0.02520
SUVE-APT-FM	ALIGN PLYS TO GUIDE	0.01935	2.00	1.00	0.03870
M2P2	SLIDE PLYS TO CLAMP POSITION	0.00860	2.00	1.00	0.01720
SUVE-000-NM	OBTAIN FLAP LINER; BRING TO FRONT	0.02365	2.00	1.00	0.04730
SUVE-APP-FS	ALIGN LINER TO PLYS	0.02560	2.00	1.00	0.05160
J2	REMOVE FINGERS FROM BETWEEN PLYS	0.00430	2.00	1.00	0.00860
F2	DROP CLAMPS	0.00430	2.00	1.00	0.00860
M4G0 M1P0	BOTH HANDS ACTIVATE MC START BUTTONS	0.01075	1.00	1.00	0.01075
BATS-CHR-MC1	BUNDLING- CHRISTINA TEAM MC#1, FLAPS	0.46665	1.00	1.00	0.03311
W5	STEP FROM MC #3D TO TABLE	0.01075	5.00	1.00	0.05375
BATM-BNDL-OD	BUNDLING-OPEN & DISPOSE TO NEXT STATION	0.19135	1.00	1.00	0.19135
W5	STEP WITH BUNDLE TO PROFILE FLAPS	0.01075	4.00	1.00	0.04300
W5	STEP FROM MC#2 BACK TO TABLE	0.01075	5.00	1.00	0.05375
BATM-BNDL-DISPO	BUNDLING-DISPOSE TO NEXT STATION	0.10105	1.00	1.00	0.10105

Company ATRC APPAREL TECH. & RES. CTR

Plant CAL POLY POMONACAL POLY POMONA

Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

W5	STEP FROM PROFILE FLAPS TO TURN FLAPS	0.01075	5.00	1.00	0.05375
● SATO-PSCOLLAR	PROFILE STITCH COLLAR, AUTOMATIC	0.63425	1.00	1.00	0.63425
SATS-PSCLR-AUTO	PROFILE STITCH COLLAR AUTOMATIC	0.19135	1.00	1.00	0.19135
SUVE-OTB-NS	OBTAIN 2 COLLAR PLYS WITH BOTH HANDS	0.03010	1.00	1.00	0.03010
M2P5	ALIGN LEFT END COLLARS TOGETHER	0.01505	1.00	1.00	0.01505
M2P5	ALIGN RIGHT END COLLARS TOGETHER	0.01505	1.00	1.00	0.01505
SUVE-APT-FS	ALIGN PLYS TO TABLE GUIDES	0.01720	1.00	1.00	0.01720
M2P5	MINOR ADJUST COLLAR TO GUIDES	0.01505	1.00	1.00	0.01505
SUVE-OOT-NM	OBTAIN 1 COLLAR LINER FROM FRONT	0.03440	1.00	1.00	0.03440
SUVE-APT-FS	ALIGN LINER TO TABLE GUIDES	0.01720	1.00	1.00	0.01720
M2P5	MINOR ADJUST LINER TO GUIDE	0.01505	1.00	1.00	0.01505
W5	STEP TO RIGHT THEN LEFT PEDAL TO ACTIVATE.	0.01075	2.00	1.00	0.02150
M4G0 M1P0	HIT BUTTONS TO START MACHINE	0.01075	1.00	1.00	0.01075
BATS-CHR-MC1X	BUNDLING- CHRISTINA TEAM M/C#1, COLLARS	0.44290	1.00	1.00	0.44290
W5	STEP FROM M/C #3D TO TABLE	0.01075	5.00	1.00	0.05375
BATM-BNDL-OD	BUNDLING-OPEN & DISPOSE TO NEXT STATION	0.19135	1.00	1.00	0.19135
W5	STEP WITH BUNDLE TO PROFILE CLR	0.01075	4.00	1.00	0.04300
W5	STEP FROM PROFILE COLLAR TO TURN MIC #2	0.01075	5.00	1.00	0.05375
BATM-BNDL-DISPO	BUNDLING-DISPOSE TO NEXT STATION	0.10105	1.00	1.00	0.10105
● SATO-TURNFLAP	TURN 2 POCKET FLAPS	0.30129	1.00	1.00	0.30129
SATS-TURNFLAP	TURN 1 POCKET FLAP	0.14520	2.00	1.00	0.29240
SUVE-OOO-NM	OBTAIN 1 POCKET FLAP; BRING TOWARD FIXTURE TO	0.02365	1.00	1.00	0.02365
J2	INSERT FINGERS BETWEEN PLYS	0.00430	2.00	1.00	0.00860
M3P2	PSN FLAP CORNER TO FIXTURE POINT	0.01075	1.00	1.00	0.01075
F2	ACTIVATE FOOT PEDAL	0.00430	1.00	1.00	0.00430
M3P0	PULL FLAP UP TO TURN FLAP ON FIXTURE	0.00645	1.00	1.00	0.00645
J2	WIGGLE TO COMPLETE TURN	0.00430	3.00	1.00	0.01290
M3P2	PSN 2ND FLAP CORNER TO FIXTURE POINT	0.01075	1.00	1.00	0.01075
F2	ACTIVATE FOOT PEDAL	0.00430	1.00	1.00	0.00430
M3P0	PULL FLAP UP TO TURN FLAP ON FIXTURE	0.00645	1.00	1.00	0.00645

Company ATRC APPAREL TECH. & RES. CTR
 Plant CAL POLY POMONACAL POLY POMONA
 Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT
 Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

J2	WIGGLE TO COMPLE 2ND FLAP POINT TURN	0.00430	3.00	1.00	0.01290
M3P2	SLIDE FLAP TO ALIGN CENTER POINT TO FIXTURE	0.01075	1.00	1.00	0.01075
J2	WIGGLE TO COMPLETE CENTER FLAP POINT TURN	0.00430	3.00	1.00	0.01290
M3P0	SLIDE TO 1ST CORNER	0.00645	1.00	1.00	0.00645
J2	WIGGLE TO FINISH 1ST CORNER TURN	0.00430	2.00	1.00	0.00650
M3P0	REMOVE FLAP FROM FIXTURE; ASIDE INTERNAL TO	0.00645	1.00	1.00	0.00645
BATS-QHR-MC2	BUNDLING- CHRISTINA TEAM M/C#2	0.13330	1.00 U-BNDL-Q	15.00	0.00889
BATM-BNDL-DISPO	BUNDLING-OPEN & DISPOSE TO NEXT STATION	0.10105	1.00	1.00	0.10105
W6	STEP WITH BUNDLE TO SGL NDL M/C#3	0.01075	3.00	1.00	0.03225
● SATO-TRNCLR-A	TURN COLLARS ON AUTOMATIC EQUIPMENT	0.44749	1.00	1.00	0.44749
SATS-TRNCLR-A	TURN COLLAR TRIM CORNERS, PRESS AUTOMATIC	0.43880	1.00	1.00	0.43880
SATS-TRTURCLR	TRIM & TURN COLLAR, LUNAPRESS	0.15480	1.00	1.00	0.15480
SATM-LUNAPRCLR	PRESS COLLAR ON AUTOMATIC LUNAPRESS	0.28380	1.00	1.00	0.28380
BATS-CHR-MC2	BUNDLING- CHRISTINA TEAM M/C#2	0.13330	1.00 U-BNDL-Q	15.00	0.00889
● SATO-TSCOLLAR-A	TOPSTITCH COLLAR	0.83775	1.00	1.00	0.83775
SATS-TSCCLR-17	TOPSTITCH 17" MARINE COLLAR	0.81139	1.00	1.00	0.81139
SUVE-000-NM	OBTAIN COLLAR FROM RHS TABLE, PULL TO	0.02365	1.00	1.00	0.02365
SUVE-APN-SS	ALIGN COLLAR/LINE TO NEEDLE	0.01290	1.00	1.00	0.01290
F2	DROP FOOT AND START SEW TO BASTE LINER TO	0.00430	1.00	1.00	0.00430
SUVF-LSS	Sew 1" LENGTH Singer 591 Single Ndl L.S.5000RPM, normal	0.00925	17.00	1.00	0.15728
F2	PEDAL TO CUT THREAD AND LIFT FOOT	0.00430	1.00	1.00	0.00430
M4P0	ROTATE COLLAR AND OPEN	0.00860	1.00	1.00	0.00860
SUVE-000-NM	OBTAIN 2ND COLLAR LINER	0.02365	1.00	1.00	0.02365
SUVE-APP-FM	ALIGN 2ND LINER TO COLLAR EDGE	0.02795	1.00	1.00	0.02795
SUVE-APN-SM	ALIGN COLLAR/LINER TO NEEDLE	0.01505	1.00	1.00	0.01505
F2	DROP FOOT AND START SEW	0.00430	1.00	1.00	0.00430
SUVE-SBB-AA	SEW BACKTACK, BUTTON	0.01505	1.00	1.00	0.01505
SUVF-LSS-10N	Sew 10" Singer 591 Single Ndl Lockstitch 4500RPM, normal	0.03756	1.00	1.00	0.03756
SUVE-RPR-SL	ROTATE COLLAR AROUND NDL TO SEW OTHER SIDE	0.02150	1.00	1.00	0.02150
F1	START SEW	0.00215	1.00	1.00	0.00215

Company ATRC APPAREL TECH. & RES. CTR

Plant CAL POLY POMONACAL POLY POMONA

Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

SUVF-LSS-10N	Sew 10" Singer 591 Single Ndl Lockstitch, 4500RPM normal	0.03756	1.00	0.03756
SUVE-SBB-AA	SEW BACKTACK, BUTTON	0.01505	1.00	0.01505
F2	PEDAL TO CUT THREAD AND LIFT FOOT	0.00430	1.00	0.00430
SUVE-RHP-AM	REGRASP COLLAR	0.01935	1.00	0.01935
SUVE-APN-SM	ALIGN COLLAR TO NEEDLE TO START TOPSTITCH	0.01505	1.00	0.01505
SUVF-LSS-JE	Sew 3" Singer 591 Single Ndl Lockstitch, 2000 RPM exact	0.03175	1.00	0.03175
SUVE-RNW-AA	REPOSITION NEEDLE USING HANDWHEEL	0.02365	1.00	0.02365
SUVE-RHP-AM	REPOSITION HANDS ON END OF COLLAR	0.01935	1.00	0.01935
SUVE-FPP-FA	FOLD COLLAR EDGE BY PINCHING AT SEAM	0.01720	1.00	0.01720
SUVF-LSS	Sew 1" LENGTH Singer 591 Single Ndl LS 5000RPM normal	0.00925	19.00	0.17578
SUVE-RNW-AA	REPOSITION NEEDLE USING HANDWHEEL	0.02365	1.00	0.02365
SUVE-RHP-AS	REPOSITION HANDS ON END OF COLLAR	0.01720	1.00	0.01720
SUVF-LSS-3N	Sew 3" Singer 591 Single Ndl Lockstitch 2000 RPM normal	0.02745	1.00	0.02745
SUVE-CTS-AA	CUT THREAD WITH PALMED SNIPS	0.01290	1.00	0.01290
SUVE-DPO-SM	DISPOSE COLLAR TO LHS TABLETOP STACK	0.01290	1.00	0.01290
BATS-CHR-MC3	BUNDLING-OPEN & DISPOSE TO NEXT STATION	0.36580	1.00 U-BNDL-Q	0.02637
W5	STEP WITH COLLARS TO M/C#3 TO TOPSTITCH	0.01075	3.00	0.03225
W5	STEP WITH FLAPS TO M/C #3 TO TOPSTITCH FLAPS	0.01075	3.00	0.03225
W6	STEP FROM M/C #2 TO TABLE	0.01075	5.00	0.05375
BATM-BNDL-OD	BUNDLING-RETRIEVE REMAINDER OF BUNDLE FROM	0.19135	1.00	0.19135
W5	STEP FROM TABLE TO M/C #3 TO HEM SLEEVES AND	0.01075	5.00	0.05375
W5	AFTER ALL OPERATIONS COMPLETE, STEP WITH	0.01075	3.00	0.03225
● SATO-JNTSYOKE	JOIN AND TOPSTITCH YOKE	0.97825	1.00	0.97825
SATS-JNYOKE-20	JOIN 20" YOKE TO BACK & TOPSTITCH YOKE	0.97355	1.00	0.97355
SUVE-OOT-SM	OBTAIN INSIDE YOKE, LAY TO TABLE	0.03870	1.00	0.03870
SUVE-OOT-NL	OBTAIN BACK PANEL, LAY TO TABLE TOP OF YOKE	0.03870	1.00	0.03870
SUVE-APP-FS	ALIGN BACK PANEL TO YOKE AT LHS	0.02580	1.00	0.02580
SUVE-OOT-NM	OBTAIN OUTSIDE YOKE, BRING TO INSIDE YOKE/BACK	0.03440	1.00	0.03440
SUVE-APP-FS	ALIGN OUTSIDE YOKE TO ASSY AT LHS	0.02580	1.00	0.02580
SUVE-APN-SS	ALIGN ASSY UNDER NEEDLE AT LHS	0.01290	1.00	0.01290

Company ATRC APPAREL TECH. & RES. CTR
 Plant CAL POLY POMONACAL POLY POMONA
 Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT
 Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

F2	DROP FOOT	0.00430	1.00	1.00	0.00430
SUVE-SBL-AA	SEW BACKTACK, LEVER	0.02150	1.00	1.00	0.02150
SUVE-RHP-AS	REPOSITION LH TO TOP PLY (3X)	0.01720	3.00	1.00	0.05160
M2G1	RH GRASP MIDDLE PLY (3X)	0.00645	3.00	1.00	0.01935
SUVE-APP-SS	ALIGN TOP PLYS (3X)	0.01935	3.00	1.00	0.05805
M3G1	RH GRASP BOTTOM PLY (3X)	0.00660	3.00	1.00	0.02580
SUVE-APP-SS	ALIGN TOP PLYS TO BOTTOM PLY (3X)	0.01935	3.00	1.00	0.05805
SUVE-APP-SS	MINOR REALIGNMENT OF TOP PLY TO MIDDLE PLY	0.01935	1.00	1.00	0.01935
F2	START MACHINE (3X)	0.00430	3.00	1.00	0.01290
SUVF-LSS-4N	Sew 6", Singer 591 Single Ndl Lockstitch, 3000 RPM, normal	0.03445	3.00	1.00	0.10335
SUVE-RHP-AS	REGRA SP END OF SEAM TO MOVE HAND OUT OF WAY	0.01720	1.00	1.00	0.01720
F2	START MACHINE	0.00430	1.00	1.00	0.00430
SUVF-LSS-1N	Sew 1", Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	0.01345	1.00	1.00	0.01345
SUVE-SBL-AA	SEW BACKTACK, LEVER	0.02150	1.00	1.00	0.02150
SUVE-RHP-AM	REGRA SP PART AT YOKE	0.01935	1.00	1.00	0.01935
M4P0	LIFT AWAY FROM MACHINE	0.00660	1.00	1.00	0.00660
SUVE-APT-NL	ALIGN BACK PANEL TO TABLE (INTERNAL, SHAKE	0.01075	1.00	1.00	0.01075
SUVE-RHP-AM	REPOSITION RH TO BACK PANEL, LH TO YOKE	0.01935	1.00	1.00	0.01935
SUVE-APN-FS	ALIGN RHS YOKE JOIN SEAM TO NEEDLE	0.01935	1.00	1.00	0.01935
F2	DROP FOOT	0.00430	1.00	1.00	0.00430
SUVF-LSS-1N	Sew 1", Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	0.01345	1.00	1.00	0.01345
M3G3 M3P0	GRASP OUTSIDE YOKE AT NECK AND PULL FLAT	0.01935	1.00	1.00	0.01935
SUVE-RHP-AS	REPOSITION HANDS DOWN SEAM TO PULL OUT	0.01720	5.00	1.00	0.08600
F2	START MACHINE (5X)	0.00430	5.00	1.00	0.02150
SUVF-LSS-4N	Sew 4", Singer 591 Single Ndl Lockstitch, 3000 RPM, normal	0.02512	5.00	1.00	0.12559
SUVE-DPT-SL	DISPOSE BACK PANEL TO LEFT WITH BOTH HANDS	0.01935	1.00	1.00	0.01935
BATS-PSNPARTS	BUNDLE HANDLING, NO WALKS, PSN PARTS ONLY	0.06450	1.00 U-BNDL-Q	15.00	0.00430
SUVE-BPP-AM	Bundling - Position medium parts	0.06450	1.00	1.00	0.06450
● SATO-TSFLAP	TOPSTITCH POCKET FLAPS	0.46682	1.00	1.00	0.46682
SATS-TSFLAP	TOPSTITCH 1 POCKET FLAP	0.23126	2.00	1.00	0.46252

Company	ATRC	APPAREL TECH. & RES. CTR			
Plant	CAL POLY POMONACAL	POLY POMONA			
Part	MARINE SS SHIRT	MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT			
Component	MARINE SS SHIRT	MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT			
SUVE-000-NS	OBTAIN 1 POCKET FLAP AND BRING TO TABLETOP	0.01935	1.00	0.01935	
SUVE-APN-SS	ALIGN ASSY TO NEEDLE	0.01290	1.00	0.01290	
F2	PEDAL TO DROP FOOT & START SEW	0.00430	1.00	0.00430	
SUVF-LSS-2E	Sew 2", Singer 591 Single Ndl Lockstitch, 2000 RPM, exact	0.02475	2.00	0.04950	
SUVF-LSS-3E	Sew 3", Singer 591 Single Ndl Lockstitch, 2000 RPM, exact	0.03175	2.00	0.06350	
SUVE-RPR-FS	ROTATE FLAP AROUND NEEDLE (3X)	0.02365	3.00	0.07095	
F1	PEDAL TO START M/C (3X)	0.00215	3.00	0.00645	
F2	PEDAL TO CUT THREAD AND LIFT FOOT	0.00430	1.00	0.00430	
0 MOD	ASIDE FINISHED FLAP INTERNAL TO NEXT PICKUP	0.00000	1.00	0.00000	
BATS-PSNPARTS	BUNDLE HANDLING, NO WALKS, PSN PARTS ONLY	0.06450	1.00	0.06450	
● SATO-HEMSLV-MCS	HEM 2 SLEEVES, MARINE SHORT SLEEVE	0.70525	1.00	0.70525	
SATS-HEMSLV-MCS	HEM 1 SLEEVE, MARINE SHORT SLEEVE	0.35048	2.00	0.70095	
SUVE-00Q-NM	OBTAIN 1 SLEEVE AND BRING TO TABLETOP	0.02365	1.00	0.02365	
SUVE-FPS-FS	FOLD SLEEVE OPENING 2 TIMES	0.02580	2.00	0.05160	
SUVE-APN-FM	ALIGN SLEEVE END TO NEEDLE	0.02150	1.00	0.02150	
F1	PEDAL TO START MACHINE	0.00215	1.00	0.00215	
SUVF-LSS-1N	Sew 1", Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	0.01345	1.00	0.01345	
SUVE-APF-SS	ALIGN SLEEVE EDGE TO FOLDER	0.02150	1.00	0.02150	
F1	PEDAL TO START MACHINE	0.00215	1.00	0.00215	
SUVF-LSS	Sew 1" LENGTH, Singer 591 Single Ndl LS, 5000RPM, normal	0.00925	14.00	0.12950	
M2P0	MOVE FOLDER OUT OF WAY	0.00430	1.00	0.00430	
SUVE-RHP-AS	REGRAIP AT END OF SLEEVE	0.01720	1.00	0.01720	
SUVE-FPS-SS	FOLD END OF SLEEVE 2 TIMES TO FINISH	0.01935	1.00	0.01935	
F1	PEDAL TO START MACHINE	0.00215	1.00	0.00215	
SUVF-LSS-2N	Sew 2", Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	0.02045	1.00	0.02045	
F2	PEDAL TO LIFT FOOT AND CUT THREAD	0.00430	1.00	0.00430	
SUVE-DPT-SM	DISPOSE 1 SLEEVE TO STACK	0.01720	1.00	0.01720	
BATS-PSNPARTS	BUNDLING-GENERIC MODULE	0.06450	1.00	0.06450	
● SATO-DNPKTHEM	DOUBLE NEEDLE HEM 2 POCKETS	0.25708	1.00	0.25708	
SATS-DNPKTHEM	DOUBLE NEEDLE POCKET HEM & CLIP APART	0.11750	2.00	0.23500	

Company ATRC APPAREL TECH. & RES. CTR

Plant CAL POLY POMONACAL POLY POMONA

Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

SUVE-000-NM	LH OBTAIN 1 POCKET AND BRING TO RH	0.02365	1.00	1.00	0.02365
SUVE-FPS-FS	FOLD TOP OF POCKET 1 TIME	0.02580	1.00	1.00	0.02580
SUVE-APN-SM	ALIGN FOLDED POCKET TO NEEDLE	0.01505	1.00	1.00	0.01505
F1	PEDAL TO START SEW	0.00215	1.00	1.00	0.00215
SUVF-DNL-6N	Sew 6" LENGTH, Singer 212 DBL Ndl LS, 1400 RPM, normal	0.01645	1.00	1.00	0.01645
SUVE-000-SS	GRASP 1 POCKET AND PULL TO STACK	0.02365	1.00	1.00	0.02365
SUVE-CPX-SA	CUT PART with scissors, XTRA CUT - SOME alignment care	0.01075	1.00	1.00	0.01075
BATS-CHR-MC4	BUNDLING- CHRISTINA TEAM M/C#4	0.33110	1.00	15.00	0.02207
W5	3 ADDITIONAL STEPS TO BUMP OPR#1 2 OF 3	0.01075	6.00	3.00	0.02150
W5	STEP FROM M/C#7 BACK TO DN PKT HEM M/C #4	0.01075	8.00	1.00	0.08600
BATM-BNDL-OD	BUNDLING-RETRIEVE REMAINDER OF BUNDLE FROM	0.19135	1.00	1.00	0.19135
W5	AFTER COMPLETE, STEP WITH BNDL TO PKT SET	0.01075	3.00	1.00	0.03225
● SATO-SETPOCKET	DURKOPP POCKET SET	0.38041	1.00	1.00	0.38041
SATS-PKTSET-DUR	DURKOPP Pocket set machine	0.18275	2.00	1.00	0.36550
SATS-SETPKT-DRK	DURKOPP Pocket set machine	0.18275	1.00	1.00	0.18275
BATS-CHR-MC6	BUNDLING- CHRISTINA TEAM M/C#5	0.22360	1.00	15.00	0.01491
BATM-BNDL-OD	BUNDLING-RETRIEVE REMAINDER OF BUNDLE FROM	0.19135	1.00	1.00	0.19135
W5	AFTER COMPLETE, STEP WITH BNDL TO 3/T OLOCK	0.01075	3.00	1.00	0.03225
● SATO-OLFACING	OVERLOCK LINER TO 2 FRONT FACINGS	1.10776	1.00	1.00	1.10776
SATS-OLFAC-MC	OVERLOCK 1 SIDE LINER TO FACING	0.54693	2.00	1.00	1.09385
SUVE-000-SM	OBTAIN FRONT PANEL AND LAY TO TABLE	0.02795	1.00	1.00	0.02795
SUVE-000-NM	OBTAIN LINER AND BRING TO OPPOSITE HAND	0.02365	1.00	1.00	0.02365
SUVE-APN-SS	ALIGN END OF LINER TO NEEDLE	0.01290	1.00	1.00	0.01290
F1	PEDAL TO START SEW TO CLEAN BOTTOM END OF	0.00215	1.00	1.00	0.00215
SUVF-OL-3N	Sew 3", US36500 OVERLOCK, 3250 RPM, NORMAL stop	0.01937	1.00	1.00	0.01937
SUVE-CTK-AA	CUT THREAD WITH VACUUM TRIMMER	0.00860	1.00	1.00	0.00860
SUVE-APP-FM	ALIGN LINER TO FRONT PANEL	0.02795	1.00	1.00	0.02795
SUVE-APN-SM	ALIGN ASSEMBLY TO M/C NEEDLE	0.01505	1.00	1.00	0.01505
F1	PEDAL TO START SEW	0.00215	4.00	1.00	0.00860
SUVF-OL-3N	Sew 3", US36500 OVERLOCK, 3250 RPM, NORMAL stop	0.01937	1.00	1.00	0.01937

Company ATRC APPAREL TECH. & RES. CTR
 Plant CAL POLY POMONACAL POLY POMONA
 Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT
 Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

SUVE-CTK-AA	CUT THREAD	1.00	0.00860	1.00	0.00860
M4P0	ROTATE FRONT PANEL ON TABLETOP	1.00	0.00860	1.00	0.00860
SUVE-RHP-AM	REGRA SP FRONT PANEL	1.00	0.01935	1.00	0.01935
SUVE-APN-SM	ALIGN TOP EDGE OF FRONT PANEL TO NEEDLE	1.00	0.01505	1.00	0.01505
SUVF-OL-3N	Sew 3", US36500 OVERLOCK, 3250 RPM, NORMAL stop	1.00	0.01937	1.00	0.01937
SUVE-RHP-AM	REGRA SP LINER/FACING	3.00	0.01935	1.00	0.05805
SUVE-APP-SS	MINOR REALIGN LINER TO FACING	3.00	0.01935	1.00	0.05805
F1	PEDAL TO START SEW TO CLEAN EDGE AND ATTACH	3.00	0.00215	1.00	0.00645
SUVF-OL-3N	Sew 6", US36500 OVERLOCK, 4550 RPM, NORMAL stop	3.00	0.02491	1.00	0.07474
SUVE-RHP-AM	REGRA SP BOTTOM OF PANEL	1.00	0.01935	1.00	0.01935
F1	PEDAL TO START MACHINE AND COMPLETE SEW	1.00	0.00215	1.00	0.00215
SUVF-OL-3N	Sew 6", US36500 OVERLOCK, 4550 RPM, NORMAL stop	1.00	0.02491	1.00	0.02491
SUVE-CTS-AA	CUT THREAD WITH PALMED SNIPS	1.00	0.01290	1.00	0.01290
SUVE-RHP-AL	REGRA SP OTHER END PANEL	1.00	0.02150	1.00	0.02150
SUVE-CTS-AA	CUT THREAD WITH PALMED SNIPS	1.00	0.01290	1.00	0.01290
SUVE-DPT-SL	DISPOSE PART WITH 2 HANDS	1.00	0.01935	1.00	0.01935
BATS-CHR-MC6	BUNDLING- CHRISTINA TEAM M/C#6	1.00	0.20855	15.00	0.01360
W6	WALK FROM 5/T OLOCK M/C #9 TO 3/T OLOCK M/C#6	7.00	0.01075	1.00	0.07525
BATM-BNDL-DISPO	BUNDLING-DISPOSE TO NEXT STATION	1.00	0.10105	1.00	0.10105
W5	AFTER COMPLETE, STEP WITH BNDL TO SGL NDL	3.00	0.01075	1.00	0.03225
SATO-ATTACHFLAP	ATTACH FLAPS TO SHIRT POCKET	1.00	1.18421	1.00	1.18421
SATS-ATTFLAP	ATTACH 1 POCKET FLAP & BASTE TOP OF FACING	2.00	0.58766	1.00	1.17533
SUVE-OOO-SM	OBTAIN FRONT AND LAY TO TABLE	1.00	0.02795	1.00	0.02795
SUVE-APN-SS	ALIGN TOP OF FACING TO NEEDLE	1.00	0.01290	1.00	0.01290
F2	DROP FOOT AND START SEW TO BASTE TOP OF	1.00	0.00430	1.00	0.00430
SUVF-LSS-3N	Sew 3", Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	1.00	0.02745	1.00	0.02745
SUVE-CTS-AA	CUT THREAD WITH PALMED SNIPS	1.00	0.01290	1.00	0.01290
SUVE-OOO-NM	OBTAIN POCKET FLAP AND BRING TO FRONT	1.00	0.02365	1.00	0.02365
SUVE-APP-FM	ALIGN FLAP TO FRONT PANEL OVER POCKET	1.00	0.02795	1.00	0.02795
SUVE-APN-SM	ALIGN ASSEMBLY TO NEEDLE	1.00	0.01505	1.00	0.01505

Company ATRC APPAREL TECH. & RES. CTR

Plant CAL POLY POMONACAL POLY POMONA

Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

F2	PEDAL TO DROP FOOT AND START SEW	1.00	0.00430	1.00	0.00430
SUVE-SBL-AA	SEW BACKTACK, LEVER	1.00	0.02150	1.00	0.02150
SUVE-RHP-AS	REGASP OPPOSITE END FLAP	1.00	0.01720	1.00	0.01720
SUVE-APP-FS	MINOR REALIGN OPPOSITE END FLAP TO FRONT	1.00	0.02580	1.00	0.02580
SUVF-LSS-2N	Sew 2", Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	2.00	0.02045	1.00	0.04090
SUVE-RHP-AS	REGASP TO MOVE FINGERS OUT OF WAY OF	1.00	0.01720	1.00	0.01720
F1	PEDAL TO START SEW	1.00	0.00215	1.00	0.00215
SUVF-LSS-1E	Sew 1", Singer 591 Single Ndl Lockstitch, 2000 RPM, exact	1.00	0.01775	1.00	0.01775
SUVE-SBL-AA	SEW BACKTACK, LEVER	1.00	0.02150	1.00	0.02150
SUVE-CTS-AA	CUT THREAD WITH PALMED SNIPS	1.00	0.01290	1.00	0.01290
M3P0	PULL PANEL BACK TOWARD BODY FROM NEEDLE	1.00	0.00645	1.00	0.00645
SUVE-FPS-SM	FOLD POCKET FLAP OVER SET SEAM	1.00	0.02365	1.00	0.02365
SUVE-RHP-AS	REGASP TO HOLD FLAP IN PLACE	1.00	0.01720	1.00	0.01720
SUVE-APN-FM	ALIGN FLAP TO NEEDLE	1.00	0.02150	1.00	0.02150
F2	PEDAL TO DROP FOOT AND START SEW TO	1.00	0.00430	1.00	0.00430
SUVE-SBL-AA	SEW BACKTACK, LEVER	1.00	0.02150	1.00	0.02150
SUVF-LSS-2N	Sew 2", Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	1.00	0.02045	1.00	0.02045
F1	START SEW	1.00	0.00215	1.00	0.00215
SUVF-LSS-2N	Sew 2", Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	1.00	0.02045	1.00	0.02045
F1	START SEW	1.00	0.00215	1.00	0.00215
SUVF-LSS-1E	Sew 1", Singer 591 Single Ndl Lockstitch, 2000 RPM, exact	1.00	0.01775	1.00	0.01775
SUVE-SBL-AA	SEW BACKTACK, LEVER	1.00	0.02150	1.00	0.02150
F2	PEDAL TO LIFT FOOT	1.00	0.00430	1.00	0.00430
SUVE-CTS-AA	CUT 2 THREADS WITH PALMED SNIPS	2.00	0.01290	1.00	0.02580
SUVE-RHP-AM	REGASP TO ACCESS OTHER SIDE	1.00	0.01935	1.00	0.01935
SUVE-CTS-AA	CUT THREAD WITH PALMED SNIPS	1.00	0.01290	1.00	0.01290
SUVE-DPO-SM	ASIDE PART TO STACK	1.00	0.01290	1.00	0.01290
BATS-CHR-MC7	BUNDLING- CHRISTINA TEAM M/C#7	1.00	0.13330	15.00	0.00889
BATM-BNDL-DISPO	BUNDLING-DISPOSE TO NEXT STATION	1.00	0.10105	1.00	0.10105
W5	AFTER COMPLETE, STEP WITH BNDL TO SGL NDL	3.00	0.01075	1.00	0.03225

Company ATRC APPAREL TECH. & RES. CTR
 Plant CAL POLY POMONACAL POLY POMONA
 Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT
 Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

M3G3	GRASP INSIDE YOKE AT NECK	0.01290	1.00	0.01290
SUVE-APP-FM	ALIGN INSIDE YOKE TO OUTSIDE YOKE/FRONT PANEL	0.02795	1.00	0.02795
SUVE-APN-SS	MINOR ALIGN ASSEMBLY UNDER NEEDLE	0.01290	1.00	0.01290
F2	DROP FOOT	0.00430	1.00	0.00430
SUVE-SBL-AA	SEW BACKTACK, LEVER	0.02150	1.00	0.02150
M3G3	GRASP OUTSIDE YOKE/FRONT PANEL AT SHOULDER	0.01290	1.00	0.01290
M3G3 M3P0	GRASP FABRIC AND MOVE OUT OF WAY	0.01935	1.00	0.01935
SUVE-OOO-FS	OBTAIN INSIDE YOKE & PSN AT SHLD TO OUTSIDE	0.03010	1.00	0.03010
F2	PEDAL TO START MACHINE	0.00430	1.00	0.00430
SUVE-LSS-8N	Sew 6", Singer 591 Single Ndl Lockstitch, 3000 RPM, normal	0.03445	1.00	0.03445
SUVE-RHP-AS	REPOSITION HANDS OUT OF WAY OF NEEDLE	0.01720	1.00	0.01720
F2	START MACHINE	0.00430	1.00	0.00430
SUVE-LSS-2N	Sew 2", Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	0.02045	1.00	0.02045
SUVE-SBL-AA	SEW BACKTACK, LEVER	0.02150	1.00	0.02150
M4G1 M4P0	GRASP & PULL TANGLED PLYS TO UNTANGLE (3X)	0.01935	1.00	0.01935
SATS-TSSHLD-QS	TOPSTITCH SHOULDER, 8" SEAMS (NO PICK UP)	0.19730	1.00	0.19730
SUVE-APN-SM	ALIGN SHOULDER SEAM TO NEEDLE	0.01505	1.00	0.01505
M3G0 M2P0	REGASP AND SPREAD SEAM BEFORE SEW	0.01075	1.00	0.01075
F2	PEDAL TO START M/C	0.00430	1.00	0.00430
SUVE-LSS-8N	Sew 8", Singer 591 Single Ndl Lockstitch, 3500 RPM, normal	0.03845	1.00	0.03845
F1	PEDAL CUT THREAD	0.00215	1.00	0.00215
M4G1 M4P0	GRASP OTHER SIDE FRONT AND STRAIGHTEN TO	0.01935	1.00	0.01935
SUVE-RHP-AM	REPOSITION HANDS TO NEXT SHOULDER	0.01935	1.00	0.01935
SUVE-DPT-SL	DISPOSE PART TO SIDE WITH TWO HANDS	0.01935	1.00	0.01935
BATS-CHR-MC8	BUNDLING- CHRISTINA TEAM M/C#8	0.13330	15.00	0.00889
BATM-BNDL-DISPO	BUNDLING-DISPOSE TO NEXT STATION	0.10105	1.00	0.10105
W6	AFTER COMPLETE, STEP WITH BNDL TO 5T OLOCK	0.01075	1.00	0.01075
SATO-SETSLVSS	SET SLEEVE AND SIDESEAM	1.65164	1.00	1.65164
SATS-SETSLV-22	SET SLEEVES, 22 INCH ARMHOLE	0.84596	1.00	0.84596
SUVE-OOT-NL	Both hands grasp garment from L tabletop at ends of armhole	0.03870	1.00	0.03870

Company ATRC APPAREL TECH. & RES. CTR

Plant CAL POLY POMONACAL POLY POMONA

Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

SUVE-RPS-AM	Reposition parts by smoothing	1.00	1.00	0.01290
SUVE-OOO-NM	Obtain sleeve from right table top w/RH & position to LH	2.00	1.00	0.04730
SUVE-APP-SM	Align sleeve to armhole opening with both hands	2.00	1.00	0.04300
SUVE-APN-SM	Align parts to needle	2.00	1.00	0.03010
3 MODS	Sew on	2.00	1.00	0.01290
SUVE-RHP-AM	REGRAASP SLEEVE/SHIRT PLYS (3X)	6.00	1.00	0.11610
SUVE-APP-SM	ALIGN SLEEVE TO ARMHOLE OPENING (3X)	6.00	1.00	0.12900
SATF-SETSLV-22	SAFETYSTITCH 27" SLEEVE SET ,3600 rpm,3 normal stop	2.00	1.00	0.25471
M3G0 M3P0	Grasp garment body w/RH & push forward out of way	2.00	1.00	0.02580
M3G0	Regrasp sleeve w/LH	2.00	1.00	0.01290
SUVE-APS-SM	Slide hands down seam and align at end	2.00	1.00	0.03870
J2	Move fingers out of way	2.00	1.00	0.00860
SUVE-CTK-AA	Cut thread w/vacuum trimmer or fixed knife	2.00	1.00	0.01720
SUVE-RHP-AM	Reposition hands on medium part	1.00	1.00	0.01935
M4P0	Turn shirt around to opposite armhole opening	1.00	1.00	0.00860
M2G0 M3P0	RH grasp bottom of garment and flip over inside out	1.00	1.00	0.01075
M2G0	Grasp shoulder w/both hands	1.00	1.00	0.00430
SUVE-DPT-NL	Dispose garment to left w/both hands	1.00	1.00	0.01505
SATM-SDSM	Sideseam, 7" SLEEVE, 17" SIDESEAM	1.00	1.00	0.79464
SUVE-OOO-NL	Obtain garment from left w/LH , position to RH	1.00	1.00	0.02795
SUVE-APS-SM	Pull garment w/RH, slide LH to seam end	2.00	1.00	0.03870
SUVE-RHP-AM	RH grasp other seam end	2.00	1.00	0.03870
SUVE-APP-SS	Align ends together	2.00	1.00	0.03870
SUVE-RHP-AM	RH grasp garment body	2.00	1.00	0.03870
M3P0	SLIDE EXCESS FABRIC OUT OF WAY	2.00	1.00	0.01290
SUVE-RHP-AM	RH grasp seam near needle	2.00	1.00	0.03870
SUVE-APS-SM	RH slide down to sleeve set seam & align	2.00	1.00	0.03870
SUVE-APN-SM	Align assembly end to needle	2.00	1.00	0.03010
3 MODS	Sew on	2.00	1.00	0.01290
SUVE-RHP-AM	LH grasp outer sleeve to guide sew	2.00	1.00	0.03870

Company ATRC APPAREL TECH. & RES. CTR
 Plant CAL POLY POMONACAL POLY POMONA
 Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT
 Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

SUVE-APP-SS	MINOR ALIGN SLEEVE AT ARMHOLE	0.01935	2.00	1.00	0.03870
SATF-SSSL-N7	SDSM 7" SHORT SLV SEAM, 35-40 rpm, SAFETYSTITCH,	0.03414	2.00	1.00	0.06827
SUVE-APS-SM	Slide RH down bottom ply	0.01935	2.00	1.00	0.03870
SUVE-RHP-AM	LH grasp garment body	0.01935	2.00	1.00	0.03870
M3P0	PUSH FABRIC OUT OF WAY	0.00645	2.00	1.00	0.01280
SUVE-RHP-AM	LH grasp top ply at bottom of seam	0.01935	2.00	1.00	0.03870
SUVE-APP-SM	Align plys at bottom of seam	0.02150	2.00	1.00	0.04300
SATF-SSSD-N17	SAFETYSTITCH SDSM 1 17" SIDE, 5850 rpm, normal	0.04714	2.00	1.00	0.09427
SUVE-CTK-AA	Cut thread w/knife or vacuum trimmer	0.00660	2.00	1.00	0.01720
M4G0 M4P0	LH grasp other side at seam end & position to RH	0.01720	1.00	1.00	0.01720
M4G0 M4P0	Both hands rotate garment to other side	0.01720	1.00	1.00	0.01720
SUVE-DPT-NL	Dispose garment to right w/both hands	0.01505	1.00	1.00	0.01505
BATS-CHR-MC9	BUNDLING- CHRISTINA TEAM M/C#9	0.16555	1.00	15.00	0.01104
W5	STEP BACK TO 5/T OLOCK M/C #9	0.01075	3.00	1.00	0.03225
BATM-BNDL-DISPO	BUNDLING-DISPOSE TO NEXT STATION	0.10105	1.00	1.00	0.10105
W6	AFTER COMPLETE, STEP WITH BNDL TO SGL NDL M/C	0.01075	3.00	1.00	0.03225
SATO-ATTACHCLR	ATTACH COLLAR	1.66905	1.00	1.00	1.66905
SATS-SETCLR-17	SET COLLAR, 17" NECK W/1 LABEL	1.66658	1.00	1.00	1.66658
SUVE-000-NL	OBTAIN SHIRT FROM RIGHT AND BRING TO LH	0.02795	1.00	1.00	0.02795
SUVE-APN-SL	ALIGN NECKLINE UNDER NEEDLE	0.01720	1.00	1.00	0.01720
SUVE-000-NM	OBTAIN COLLAR AND BRING TOWARD NEEDLE	0.02365	1.00	1.00	0.02365
SUVE-APP-FM	ALIGN COLLAR TO NECKLINE	0.02795	1.00	1.00	0.02795
F2	PEDAL START M/C	0.00430	1.00	1.00	0.00430
SUVF-LSS-2N	Sew 2" Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	0.02045	1.00	1.00	0.02045
F1	PEDAL TO CUT THREAD	0.00215	1.00	1.00	0.00215
M3P0	MOVE PART TO SIDE OF NEEDLE	0.00645	1.00	1.00	0.00645
SUVE-FPS-FM	GRASP AND FOLD FACING OVER COLLAR	0.03010	1.00	1.00	0.03010
SUVE-APN-FM	ALIGN END OF FOLDED ASSY TO NEEDLE	0.02150	1.00	1.00	0.02150
F2	PEDAL TO DROP FOOT AND START M/C	0.00430	1.00	1.00	0.00430
SUVE-SBB-AA	SEW BACKTACK, BUTTON	0.01505	1.00	1.00	0.01505

Company ATRC APPAREL TECH. & RES. CTR

Plant CAL POLY POMONACAL POLY POMONA

Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

SUVE-RHP-AM	REGRASP COLLAR	0.01935	1.00	1.00	0.01935
SUVE-APP-FM	ALIGN COLLAR TO NECKLINE	0.02795	1.00	1.00	0.02795
SUVE-RHP-AS	REGRASP FACING	0.01720	1.00	1.00	0.01720
SUVE-APP-FS	ALIGN FACING TO NECKLINE	0.02580	1.00	1.00	0.02580
SUVE-LSS-1N	Sew 1" Singer 591 Ndl Lockstitch, 2000 RPM, normal	0.01345	1.00	1.00	0.01345
SUVE-RHP-AM	REGRASP COLLAR AT LHS SHLD	0.01935	1.00	1.00	0.01935
SUVE-APP-FM	ALIGN COLLAR TO LH SHLD	0.02795	1.00	1.00	0.02795
SUVE-LSS-3N	Sew 3" Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	0.02745	1.00	1.00	0.02745
SUVE-CPS-FS	NOTCH COLLAR WITH SNIPS 4" FROM END	0.04085	1.00	1.00	0.04085
SUVE-FPS-SS	FOLD BACK TOP COLLAR PLY BEHIND NOTCH	0.01935	1.00	1.00	0.01935
SUVE-LSS-1N	Sew 1" Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	0.01345	1.00	1.00	0.01345
SUVE-RHP-AM	REGRASP COLLAR TO SEW ACROSS BACK (2X)	0.01935	2.00	1.00	0.03870
SUVE-APP-FM	ALIGN COLLAR TO NECK (2X)	0.02795	2.00	1.00	0.05590
SUVE-LSS-3N	Sew 3" Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	0.02745	2.00	1.00	0.05490
F2	PEDAL TO CUT THREAD AND LIFT FOOT	0.00430	1.00	1.00	0.00430
M3P0	MOVE GARMENT FROM UNDER FOOT	0.00645	1.00	1.00	0.00645
SUVE-RHP-AM	REGRASP RHS COLLAR	0.01935	1.00	1.00	0.01935
SUVE-APP-FM	ALIGN RHS COLLAR TO NECK	0.02795	1.00	1.00	0.02795
SUVE-APN-SS	MOVE COLLAR/NECK TO NEEDLE	0.01290	1.00	1.00	0.01290
F2	DROP FOOT TO BASTE COLLAR TO RHS NECKLINE	0.00430	1.00	1.00	0.00430
SUVE-LSS-3N	Sew 3" Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	0.02745	1.00	1.00	0.02745
F2	PEDAL TO CUT THREAD AND RAISE FOOT	0.00430	1.00	1.00	0.00430
SUVE-RHP-AM	GRASP RHS FACING	0.01935	1.00	1.00	0.01935
SUVE-FPS-FM	FOLD RHS FACING TO NECKLINE	0.03010	1.00	1.00	0.03010
SUVE-APN-FM	ALIGN RH END OF COLLAR TO NEEDLE	0.02150	1.00	1.00	0.02150
F2	PEDAL TO DROP FOOT AND START TO SEW RH END	0.00430	1.00	1.00	0.00430
SUVE-LSS-2E	Sew 2" Singer 591 Single Ndl Lockstitch, 2000 RPM, exact	0.02475	1.00	1.00	0.02475
SUVE-SBB-AA	SEW BACKTACK, BUTTON	0.01505	1.00	1.00	0.01505
F2	PEDAL TO CUT THREAD AND LIFT FOOT	0.00430	1.00	1.00	0.00430
SUVE-APN-FM	ALIGN END OF COLLAR SET SEAM TO NEEDLE	0.02150	1.00	1.00	0.02150

Company ATRC APPAREL TECH. & RES. CTR

Plant CAL POLY POMONACAL POLY POMONA

Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

F2	DROP FOOT	0.00430	1.00	1.00	0.00430
SUVE-SBB-AA	SEW BACKTACK, BUTTON	0.01505	1.00	1.00	0.01505
SUVE-RHP-AM	REGASP RHS END OF FACING	0.01935	1.00	1.00	0.01935
SUVE-FPS-FM	FOLD FACING TO NECKLINE	0.03010	1.00	1.00	0.03010
SUVE-CTS-AA	CUT NOTCH WITH SNIPS AT RHS SHOULDER	0.01290	1.00	1.00	0.01290
SUVE-RHP-AS	GRASP TOP COLLAR PLY	0.01720	1.00	1.00	0.01720
SUVE-FPS-SS	FOLD BACK TOP COLLAR PLY	0.01935	1.00	1.00	0.01935
F1	PEDAL TO START SEW AND COMPLETE SEAM	0.00215	1.00	1.00	0.00215
SUVE-LSS-JE	Sew 3", Singer 591 Single Ndl Lockstitch, 2000 RPM, exact	0.03175	1.00	1.00	0.03175
SUVE-SBB-AA	SEW BACKTACK, BUTTON	0.01505	1.00	1.00	0.01505
F2	PEDAL TO CUT THREAD AND LIFT FOOT	0.00430	1.00	1.00	0.00430
SUVE-APN-FM	ALIGN TOP COLLAR TO NEEDLE	0.02150	1.00	1.00	0.02150
F2	PEDAL TO DROP FOOT AND START SEW	0.00430	1.00	1.00	0.00430
SUVE-SBB-AA	SEW BACKTACK, BUTTON	0.01505	1.00	1.00	0.01505
SUVE-RHP-AM	REGASP LHS END OF FACING	0.01935	1.00	1.00	0.01935
SUVE-FPS-FS	FOLD END OF LHS FACING	0.02580	1.00	1.00	0.02580
SUVE-APP-FS	ALIGN END OF LHS FACING TO NECKLINE	0.02580	1.00	1.00	0.02580
SUVE-RHP-AM	REGASP COLLAR AT RHS SHOULDER	0.01935	1.00	1.00	0.01935
SUVE-FPP-FA	PINCH FOLD TOP COLLAR PLY AT RHS SHOULDER	0.01720	1.00	1.00	0.01720
F1	PEDAL TO START SEW	0.00215	1.00	1.00	0.00215
SUVE-LSS-JN	Sew 3", Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	0.02745	2.00	1.00	0.05490
SUVE-OLB-SA	OBTAIN LABEL AND PSN TO SEAM	0.02795	1.00	1.00	0.02795
SUVE-RHP-AM	REGASP PINCH FOLD COLLAR (2X)	0.01935	2.00	1.00	0.03870
SUVE-APP-FS	MINOR ALIGN COLLAR TO NECKLINE (2X)	0.02580	2.00	1.00	0.05160
SUVE-RHP-AM	GRASP RHS FACING END	0.01935	1.00	1.00	0.01935
SUVE-APP-FS	ALIGN RHS FACING END TO NECKLINE	0.02580	1.00	1.00	0.02580
SUVE-RHP-AS	REGASP NECKLINE TO HOLD	0.01720	1.00	1.00	0.01720
F1	PEDAL TO FINISH COLLAR ATTACH	0.00215	1.00	1.00	0.00215
SUVE-LSS-JN	Sew 3", Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	0.02745	1.00	1.00	0.02745
SUVE-SBB-AA	SEW BACKTACK, BUTTON	0.01505	1.00	1.00	0.01505

Company ATRC APPAREL TECH. & RES. CTR

Plant CAL POLY POMONACAL POLY POMONA

Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

F2	PEDAL TO CUT THREAD AND LIFT FOOT	0.00430	1.00	1.00	0.00430
SUVE-APN-FM	ALIGN NECKLINE TO NEEDLE AT SHOULDER	0.02150	2.00	1.00	0.04300
SUVE-APP-FS	ALIGN LOOSE END OF FACING TO SHLD SEAM	0.02580	2.00	1.00	0.05160
F1	PEDAL TO START SEW	0.00215	2.00	1.00	0.00430
SUVE-SBB-AA	SEW BACKTACK, BUTTON	0.01505	2.00	1.00	0.03010
SUVF-LSS-1BE	Sew 1 1/2" Singer 591 SGL Ndl Lockstitch, 2000 RPM, exact	0.02125	2.00	1.00	0.04251
SUVE-SBB-AA	SEW BACKTACK, BUTTON	0.01505	2.00	1.00	0.03010
F2	PEDAL TO CUT THREAD AND LIFT FOOT	0.00430	2.00	1.00	0.00860
SUVE-DPT-SL	DISPOSE GARMENT TO LH BAR	0.01935	1.00	1.00	0.01935
BATS-CHR-MC10	BUNDLING- CHRISTINA TEAM M/C#10	0.18705	1.00	15.00	0.01247
W5	3 ADDITIONAL STEPS TO BUMP OPR#42 OF 3	0.01075	6.00	3.00	0.02150
W5	STEP BACK TO SGL NDL M/C #10	0.01075	3.00	1.00	0.03225
BATM-BNDL-DISPO	BUNDLING-DISPOSE TO NEXT STATION	0.10105	1.00	1.00	0.10105
W5	AFTER COMPLETE, STEP WITH BNDL TO SGL NDL	0.01075	3.00	1.00	0.03225
• SATO-HEM-BOTTOM	SHIRTTAIL HEM BOTTOM	1.22715	1.00	1.00	1.22715
SATS-HEMBTM	SHIRTTAIL HEM 56" SHIRT BOTTOM W/FOLDER & TACK	1.20966	1.00	1.00	1.20966
SUVE-OOO-NL	OBTAIN SHIRT FROM RHS OPERATOR; PULL TO LH AT	0.02795	1.00	1.00	0.02795
SUVE-RHP-AL	REGASP SHIRT AT BOTTOM THEN TOP PLACKET	0.02150	2.00	1.00	0.04300
SUVE-APN-SM	ALIGN BOTTOM THEN TOP PLACKET FACING UNDER	0.01505	2.00	1.00	0.03010
F2	DROP FOOT AND START SEW	0.00430	2.00	1.00	0.00860
SUVE-SBB-AA	SEW BACKTACK, BUTTON	0.01505	2.00	1.00	0.03010
SUVF-LSS-3N	PUSH OUT CORNER	0.02745	2.00	1.00	0.05490
SUVE-SBB-AA	SEW BACKTACK, BUTTON	0.01505	2.00	1.00	0.03010
M3P0	REMOVE FROM UNDER NEEDLE	0.00645	2.00	1.00	0.01290
SUVE-RHP-AM	GRASP BOTTOM PLACKET	0.01935	2.00	1.00	0.03870
SUVE-APP-SM	FOLD PLACKET FACING BACK	0.02150	2.00	1.00	0.04300
SUVE-APN-SM	ALIGN BOTTOM OF PLACKET TO NEEDLE TO TACK	0.01505	2.00	1.00	0.03010
F2	DROP FOOT AND START SEW	0.00430	2.00	1.00	0.00860
SUVF-LSS-3N	Sew 3" Singer 591 Single Ndl Lockstitch, 2000 RPM, normal	0.02745	2.00	1.00	0.05490
SUVE-RHP-AS	GRASP END OF BOTTOM PLACKET	0.01720	1.00	1.00	0.01720

Company ATRC APPAREL TECH. & RES. CTR

Plant CAL POLY POMONACAL POLY POMONA

Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

M3G1	RH REGRASP BOTTOM PLACKET	0.00860	1.00	1.00	0.00860
SUVE-FPS-FS	FOLD SHIRT TAIL 2 TIMES	0.02580	2.00	1.00	0.05160
SUVE-APN-FS	ALIGN FOLDED EDGE TO NEEDLE	0.01935	1.00	1.00	0.01935
F2	PEDAL TO DROP FOOT AND START SEW	0.00430	1.00	1.00	0.00430
SUVE-SBB-AA	SEW BACKTACK, BUTTON	0.01505	1.00	1.00	0.01505
SUVE-APT-FS	ALIGN SHIRT TAIL TO FOLDER	0.02795	1.00	1.00	0.02795
F1	PEDAL TO START SEW	0.00215	14.00	1.00	0.03010
SUVF-LSS-4N	Sew 4", Singer 551 Single Ndl Lockstitch, 3000 RPM, normal	0.02512	14.00	1.00	0.35166
SUVE-RHP-AS	REGRASP SHIRT TAIL	0.01720	14.00	1.00	0.24080
SUVE-SBB-AA	SEW BACKTACK, BUTTON	0.01505	1.00	1.00	0.01505
SUVE-OPD-SL	ASIDE PART TO RIGHT	0.01505	1.00	1.00	0.01505
BATS-CHR-MC11	BUNDLING- CHRISTINA TEAM MC#11	0.26230	1.00 U-BNDL-Q	15.00	0.01749
W5	3 ADDITIONAL STEPS TO BUMP OPR#5 2 OF 3	0.01075	6.00	3.00	0.02150
W6	STEP BACK TO SGL NDL M/C #11 FROM FINISHED	0.01075	10.00	1.00	0.10750
BATM-BNDL-DISPO	BUNDLING-DISPOSE TO NEXT STATION	0.0105	1.00	1.00	0.10105
W6	AFTER COMPLETE, STEP WITH BNDL TO	0.01075	3.00	1.00	0.03225
● SATO-BUTTONHOLE	SEW 5 BUTTONHOLES TO FRONT, 2 TO POCKETS	0.61224	1.00	1.00	0.61224
SATS-BTNH-MCS	SEW BUTTONHOLES TO MARINE SHIRT, 5 PLACKET, 2	0.60120	1.00	1.00	0.60120
SUVE-OOT-AL	OBTAIN SHIRT FROM LHS BAR, BRING TO TORSO	0.03870	1.00	1.00	0.03870
SUVE-RHP-AM	REGRASP SHIRT AT RHS THEN LHS POCKET FLAP	0.01935	2.00	1.00	0.03870
SUVE-APT-FM	ALIGN FLAP TO GUIDE MARKS ON BUTTONHOLE	0.01935	2.00	1.00	0.03870
F1	PEDAL TO START MACHINE & SEW BUTTONHOLE TO	0.00215	2.00	1.00	0.00430
SATT-SEWBTH-MC	SEW BUTTON HOLE MACHINE TIME TO MARINE SHIRT,	0.04500	2.00	1.00	0.09000
SUVE-RHP-AM	REGRASP TOP OF PLACKET FACING	0.01935	1.00	1.00	0.01935
SUVE-APT-FL	ALIGN TOP PLACKET UNDER PRESSER FOOT TO	0.02150	1.00	1.00	0.02150
F2	PEDAL TO START JUKI BUTTONHOLE MACHINE	0.00430	1.00	1.00	0.00430
SATT-SEWBTH-MC	SEW BUTTON MACHINE TIME, MARINE CORPS	0.03000	5.00	1.00	0.15000
SUVE-APT-NS	PULL FINISHED BUTTONHOLE FROM UNDER PRESSER	0.00645	4.00	1.00	0.02580
SUVE-RHP-AS	REGRASP PART AT LAST BUTTON HOLE (4 TIMES)	0.01720	4.00	1.00	0.06880
SUVE-APT-FS	ALIGN LAST BUTTONHOLE TO MACHINE GUIDE (4	0.01720	4.00	1.00	0.06880

Company ATRC APPAREL TECH. & RES. CTR

Plant CAL POLY POMONACAL POLY POMONA

Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

F2	PEDAL START JUKI BUTTONHOLE MACHINE (4 TIMES)	0.00430	400	1.00	0.01720
SUVE-DPO-SL	DISPOSE SHIRT TO RHS BAR WITH ONE HAND	0.01505	100	1.00	0.01505
BATS-CHR-MC12	BUNDLING- CHRISTINA TEAM M/C#12	0.16555	1.00 U-BNDL-Q	15.00	0.01104
W5	STEP BACK TO BUTTONHOLE M/C #12	0.01075	300	1.00	0.03225
BATM-BNDL-DISPO	BUNDLING-DISPOSE TO NEXT STATION	0.10105	100	1.00	0.10105
W5	AFTER COMPLETE, STEP WITH BNDL TO BUTTON SET	0.01075	300	1.00	0.03225
● SATO-BUTTONSEW	SEW 5 BUTTONS TO FRONT, 2 BUTTONS TO POCKETS	0.68544	100	1.00	0.68544
SATS-BTNSEW	SEW 5 BUTTONS TO PLKT, 2 BUTTONS TO POCKET	0.67440	100	1.00	0.67440
SUVE-OOT-NL	OBTAIN SHIRT FROM BAR	0.03870	100	1.00	0.03870
SUVE-APT-SL	LAY SHIRT TO TABLETOP	0.01505	100	1.00	0.01505
M4G1	GET MARKER	0.01075	100	1.00	0.01075
M4P2	PUT TO LH THEN RH POCKET BUTTONHOLE	0.01290	200	1.00	0.02580
M1P0	MAKE SMALL MARK FOR BUTTON	0.00215	400	1.00	0.00860
M4P0	ASIDE MARKER	0.00860	100	1.00	0.00860
SUVE-RHP-AM	GRASP INSIDE LH THEN RH POCKET	0.01935	200	1.00	0.03870
SUVE-APN-FM	ALIGN LH THEN RH POCKET TO MACHINE	0.02150	200	1.00	0.04300
F2	PEDAL START BUTTON HOLE MACHINE	0.00430	200	1.00	0.00860
SATT-SEWBTN-MC	SEW BUTTON MACHINE TIME, MARINE CORPS	0.03000	200	1.00	0.06000
SUVE-RHP-AM	REPOSITION RH TO TOP PLACKET	0.01935	100	1.00	0.01935
SUVE-RHP-AM	LH GRASP OPPOSITE PLACKET	0.01935	100	1.00	0.01935
SUVE-APP-FM	ALIGN TOP OF LEFT AND RIGHT PLACKETS	0.02795	100	1.00	0.02795
SUVE-APS-FL	ALIGN PLACKETS BY SLIDING RH DOWN TO BOTTOM	0.02785	100	1.00	0.02785
SUVE-APP-FS	MINOR ADJUST ALIGNMENT OF PLACKETS	0.02580	100	1.00	0.02580
SUVE-APN-FM	ALIGN PLACKET TO BTN SEW 5 BUTTONS	0.02150	500	1.00	0.10750
F2	ACTIVATE FOOT PEDAL (X5)	0.00430	500	1.00	0.02150
SATT-SEWBTN-MC	SEW BUTTON MACHINE TIME, MARINE CORPS	0.03000	500	1.00	0.15000
SUVE-DPO-SL	DISPOSE FINISHED SHIRT TO BAR	0.01505	100	1.00	0.01505
W6	2 STEPS RETURN TO LOCKSTITCH M/C	0.01075	200	10.00	0.00215
BATS-CHR-MC13	BUNDLING- CHRISTINA TEAM M/C#13	0.16555	1.00 U-BNDL-Q	15.00	0.01104
W6	STEP BACK TO BUTTON SEW M/C #13	0.01075	300	1.00	0.03225

Company ATRC APPAREL TECH. & RES. CTR

Plant CAL POLY POMONACAL POLY POMONA

Part MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

Component MARINE SS SHIRT MARINE MAN'S QTR LENGHT SHORT SLEEVE SHIRT

BATM-BNDL-DISPO	BUNDLING-DISPOSE TO NEXT STATION	1.00	1.00	0.10105	1.00	0.10105
W6	AFTER COMPLETE, STEP WITH BNDL TO BARTACK	3.00	1.00	0.01075	1.00	0.03225
SATO-TACKSLV	TACK SEAM DOWN ON SLEEVE SEAMS	1.00	1.00	0.23379	1.00	0.23379
SATS-TKSLV	TACK SIDESEAM AT END OF 1 SLEEVE	1.00	1.00	0.22275	1.00	0.22275
SUVE-OOO-SL	OBTAIN SHIRT AT SLEEVE OPENING	1.00	1.00	0.03225	1.00	0.03225
M4G3	INSERT HAND THRU SLEEVE TO END AND GRASP	1.00	1.00	0.01505	1.00	0.01505
SUVE-RHP-AM	INSERT OTHER HAND THRU OPPOSITE SLEEVE TO	1.00	1.00	0.01935	1.00	0.01935
M4P0	PULL SLEEVE ENDS TO TURN RIGHT SIDE OUT	1.00	1.00	0.00860	1.00	0.00860
SUVE-RHP-AM	RH GRASP LEFT SLEEVE (MAINTAIN HOLD OF RIGHT	1.00	1.00	0.01935	1.00	0.01935
M2G1 M2P0	FOLD SEAM OVER	2.00	1.00	0.01075	1.00	0.02150
SUVE-APN-SM	ALIGN SLEEVE SEAM TO NEEDLE	2.00	1.00	0.01505	1.00	0.03010
F1	PEDAL TO START SEW	2.00	1.00	0.00215	1.00	0.00430
SATT-TACK	MACHINE TIME FOR SLEEVE END TACK	2.00	1.00	0.02000	1.00	0.04000
SUVE-RHP-AS	LH GRASP RIGHT SLEEVE & REPEAT ABOVE	1.00	1.00	0.01720	1.00	0.01720
SUVE-DPO-SL	DISPOSE PART TO SIDE	1.00	1.00	0.01505	1.00	0.01505
BATS-CHR-MC14	BUNDLING- CHRISTINA TEAM M/C#14	1.00	1.00	0.16555	15.00	0.01104
W5	STEP BACK TO BARTACK M/C #14	3.00	1.00	0.01075	1.00	0.03225
BATM-BNDL-DISPO	BUNDLING-DISPOSE TO NEXT STATION	1.00	1.00	0.10105	1.00	0.10105
W5	AFTER COMPLETE, STEP WITH BNDL TO FINISHED	3.00	1.00	0.01075	1.00	0.03225
FATO-PRESS-MSS	PRESS, MARINE SHORT SLEEVE	1.00	1.00	1.54890	1.00	1.54890
FATS-PRESS-MSS	PRESS, MARINE SHORT SLEEVE	1.00	1.00	1.54890	1.00	1.54890
FATT-PRESS-MCSS	PRESS, MARINE SHORT SLEEVE MAN'S SHIRT	1.00	1.00	1.54890	1.00	1.54890
FATO-INSPECT-MS	INSPECT, BUTTON & TRIM MARINE SHORT SLEEVE	1.00	1.00	1.63560	1.00	1.63560
FATS-INSPECT-MS	INSPECT, MARINE SHORT SLEEVE	1.00	1.00	1.63560	1.00	1.63560
FATT-INSBTN-MSS	INSPECT, BUTTON, TRIM, MARINE SHORT SLEEVE	1.00	1.00	1.63560	1.00	1.63560
FATO-FOLD-MSS	FOLD AND BAG, MARINE SHORT SLEEVE	1.00	1.00	0.84090	1.00	0.84090
FATS-FOLD-MSS	FOLD AND BAG, MARINE SHORT SLEEVE	1.00	1.00	0.84090	1.00	0.84090
FATT-FOLDBAG-MS	FOLD, BAG, MARINE SHORT SLEEVE MAN'S SHIRT	1.00	1.00	0.84090	1.00	0.84090

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